CHAPTER - III

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CHAPTER - III
RESEARCH DESIGN

3.1 STATEMENT OF THE PROBLEM:

In public transportation system buses ply between sources and destinations using one specific fixed route, there by not utilizing or sometimes underutilizing the alternative routes (Roads) available between a source and destination. These routes could be potential routes for high capacity of passengers who are willing to use these alternative routes. Thus the routes are underutilized. We can use price as a factor for shifting the demand from over-utilized to underutilized roads / routes. That is using differential pricing to shift demand from over-utilized routes to underutilized routes.

Secondly Fares are typically set at the state level, mostly on an adhoc and political basis not commensurate with principles of pricing, cost recovery. Under the political influence, the State Governments are often forced to keep bus fares at affordable prices, and this seriously undermines the financial viability of bus operations.

Thus the problems identified are:

1. There is differential capacity utilization of routes. Some routes are over utilized and some are under utilized. Pricing can be used as driver to shift passengers from over utilized to underutilized routes /roads. If alternative routes (underutilized routes) are used it will help reduce road congestion, serve passengers better.

2. What are the various factors passengers consider important when they choose to travel?

3. Use differential pricing to improve the financial viability of bus operations

4. There is no application of spatial decision support systems in decision-making.

This study helps to find the alternate routes between a source and destination along with the shortest path or the fixed route between a source and destination by using a spatial decision support system. This system allows passengers to choose the route they wish to take. (Provided the transport company is ready to ply the buses in those routes). Secondly the study helps us to understand the factors passengers consider important when they plan to travel by public transport. Finally study try's to understand whether differential pricing can be used, as pricing policy to calculate the fare based on the difficulty factor a passenger is willing to experience.

3.2 OBJECTIVE OF THE STUDY:

The objective of the study "Business Graphics- A New Approach to Decision Making" is to develop a spatial decision support system for customer driven routings with differential pricing, which

1. Displays alternative routes between a source and destination along with the shortest route (or the route being used by the transport organization). Thus allowing the passenger to be aware of all the

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possible routes between a source and destination which he can choose when he plans to travel.

2. Provides passengers to have prior information about the road network, distance, time taken to travel, route selected.

3. Becomes a useful tool for managers to make business decisions based on the difficulty factor equation.

4. To know the factors considered important by different category of passenger when they travel by public transport.

With these inputs managers will be able to make better business decisions to serve customers better.

3.3 FORMULATION OF HYPOTHESIS:

Public transport is essentially a service where customers hire the services of the bus and its driver for the duration of the journey. A service provider like NWKRTC in order to be profitable would be interested to know what type of "Value Added Services" the passengers expect from them.

Between a source and destination there could be one shortest route and many alternate routes, which are longer in terms of distance. This shortest route would obviously be congested because every other person is running the vehicles on the shortest route. Service provider would be interested to know whether passengers would be willing to travel by "alternate routes". Running buses on congested roads results in reduced average vehicle speed and

increases the time and costs per service kilometer[2]. Service provider would also like to know whether the passengers would be willing to spare extra time and money to travel by the longer route.

Public transporter would definitely be interested to know whether Information Technology (IT) could be put to use to benefit the passengers. IT usage could be in-terms of:

1. Provide Internet booking facility, or tie up with post office for example to provide Internet booking to passengers.

2. Set up Automated Information System (AIS) at various kiosks. AIS will provide graphic display of shortest route and alternate route between a source and destination and other details like travel time, road type.

GIS as tool can be used to integrate business variables in terms of price, cost and profit/loss for making business decisions.

All said and done public transporter would be interested to understand how its personnel treat passengers in general and senior citizen in particular. It's also very important for the service provider to know what passengers think and feel about their service. Ho is related to customer wants. This is incorporated in business decision support system.

Issues like the above and many more like them has lead to the humble effort of formulating the following hypothesis.

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2. Brendan Phillips, Peter Sanders, 1999, Time-based Zones: An Alternate Pricing Strategy; Journal of Product and Brand Management, Vol. 8, No.1, Pp. 73-82.

3.3.1 Hypothesis:

1. Value added services have no influence on passengers when they plan a journey.

2. Alternate routes to a destination make no significant difference to passengers when compared to one regular route.

3. Passengers do not change the travel plan even when they have prior information about road network, travel time and travel distance.

4. Oral description about route, travel time, travel distance, pricing is more convincing than graphic presentation.

5. Passengers are not willing to pay different tariffs for different routes between a source and destination.

6. People in the middle-income group do not consider public transport as an ideal mode of transport.

7. Age of the respondent makes no significant difference in making use of advance information technology.

8. There is significant association between clean and safe bus and passenger's attitude.

9. Passengers feel ladies do not feel safe when they travel alone by public transport.

10. Public transport bus personnel take good care of senior citizens.

3.4 METHODOLOGY:

3.4.1. Data Source:

The study depends on both the primary and secondary data for collecting relevant facts required for achieving its objectives. Primary data source include structured questionnaire having Likert's five-point scale for collecting attitudinal data.

Secondary sources of data collection included reports, records, periodicals, Internet, EBSCO database; Engineering Valley, Online Journal like Science Direct; European Journal of Operations Research, Government organizations like the Survey of India (SOI), National Resource Database Management Systems (NRDMS) centers and Northwest Karnataka Road Transport Corporation (NWKRTC).

3.4.2 Sampling Size:

It is the limitation for any researcher in any faculty of knowledge to undertake research on a national scale. A sample of 200 passengers both male and female respondents from various categories likes students, government employees, agriculturists, people working for private companies, self employed persons and others (people above 60 years of age and people who have retired) were selected. A structured questionnaire was administered for data collection. This questionnaire is used to collect data, to understand what are the factors passenger considers important when they plan to travel?

In the second phase of research, another sample of 200 passengers were administered a structured questionnaire to understand the level of difficulty passengers are willing to undergo, while traveling.

3.4.3 Sampling Area:

The sampling area that was selected for data collection was Hubli, Dharwad and Belgaum. Hubli is a part of Dharwad district and Belgaum is considered because it's the closest neighboring district to the Dharwad district.

3.4.4 Data Analysis Tool:

Statistical Package for Social Science (SPSS) package Version 10.0 is used to analyze the data. Various statistical tools are applied to analyze the data and the outputs interpreted. Some of the statistical tools used for analysis are:

1. Factor Analysis for data reduction.

2. Perceptual Mapping using discriminate analysis.

3. Chi-square test.

4. Student't' test.

3.4.5 System Development Tools:

1. MapInfo Version 7.8 SCP as back end tool.

2. Visual Basic 6 as front end tool.

3.5 LIMITATIONS:

1. In this study we are restricting ourselves:

   a. To display road network and

   b. Route generation.

The system does not provide any information about the location of various utilities like hospital, tourist spots, government and private offices, restaurants, etc along the road network.

2. Route generation is between taluka headquarters only. For example routes are generated between Dharwad and Kalaghatgi.

3. Difficulty factor equations calculated for the total sample size is used for further analysis and display of the results in 3-dimension view. However the difficulty factor calculations for various segments are presented in Annexure - B and are not considered in the system that is developed.

3.6 PROPOSED CHAPTER SCHEME:

The thesis is presented in nine chapters as per the details given below:

The first chapter being an "introductory" in nature describes transport network, it describes the total road length and different categories of roads in India, Karnataka state and Dharwad district. An insight into intelligent transport system is also given; chapter one also introduces the concepts of Decision Support Systems (DSS), Spatial Decision Support Systems (SDSS) and Difficulty Factor (DF).

The second chapter, "Review of Literature" provides deep insight in to the literature on Geographical information system's based transportation studies. It also discusses the role of Information Technology in transportation. Chapter two concludes by stating the need for the present study.

"Research Design" is presented in the third chapter. It covers the statement of the problem, Objectives of the study, details on methodology including, tools and techniques of data collection and their sources, sampling size and study

area, tools used for data analysis details about MapInfo as backend tool (Database) and Visual Basic 6 as frontend tool.

An "Overview of Geographic Information System" is presented in chapter four. This chapter provides an insight into what Geographic Information System (GIS) is all about, it starts with defining the term GIS, components of a GIS, Data types in GIS, application of GIS, benefits and difficulties of GIS, the chapter also discusses "GIS in India"- scenario, issues and the Indian market.

The fifth chapter entitled "GIS and Transport-related fields of application", discusses about three generic fields in which GIS has been applied to transport such as Transport planning, Management of infrastructure and Fleet and logistics management.

Sixth chapter deals with "Data processes, Analysis of the output, Plotting and Interpretation of perceptual maps, findings of the analysis, conclusions and recommendations.

In chapter seven the Development of Spatial decision support system using MapInfo and Visual Basic 6 is discussed.

Eighth chapter contains the analysis and conclusions regarding difficulty factor. Ninth chapter deals with the conclusions for the complete study, recommendations and scope for future research.