

# THE DEVELOPMENT OF A CONCEPTUAL FRAMEWORK FOR EVALUATING THE IMPACT OF RURAL TRANSIT-DEPENDENT RIDERS (RTDR) BENEFITS FOR ALABAMA COUNTIES

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## ABSTRACT

This paper proposes a conceptual framework for evaluating the impact of rural transit-dependent riders (RTDR) benefits in Alabama counties based on detailed review of the existing literature. The conceptual framework consists of three components: rural public transportation services; economic benefits of rural transit riders; and elderly route choice behaviour. It is envisaged that this theoretical models will reveal the association between rural transit-dependent riders and counties local economy; as well as contribute to broadening the methodology by which links between public expenditures and economic development can be established. The paper concludes that the communities should not overlook the economic influence of the RTDR.

## 1. INTRODUCTION

For over 20 years the US government has played an important part in the financial support of rural transit programs across the nations.

Notwithstanding, the mobility of persons with disabilities and the economic structure of these areas depend on the access to public transportation. It should be noted that regional systems could significantly improve access to jobs, medical services, educational programs, shopping, tourism and recreation. But unfortunately, these limitations of improved accessibility put rural communities in despairing situations causing economic crisis and dependability of persons to governmental programs to meet basic needs.

Furthermore, accessibility by public transit presents the opportunity for increased commercial activity, as travel to the location is more readily for both patrons and employees, and in turn the public transit riders contribute to the counties local economy. Major investment studies are now required for any rural public transportation investment. Meyer, Nelson and Peng (1996) offer significant insights into methodologies for evaluating the economic effects and impacts of public transportation and programs in both local and state levels. These authors reported, "Investment in the transportation system is a critical element of state's strategy to enhance economic development and promote the quality of life of its citizens."

There has been substantial interest in recent years in using transportation investment in rural areas to provide the necessary public services that will improve rural life. With limited resources, however, such investment decisions must be made with the best possible information on the likely benefits and costs associated with different strategies.

The influence of the expansion of capacity in urban areas is influential in rural areas as well. It should be noted that strong bonds between urban and rural areas are created by changes in transportation technology.

Furthermore, the lack of rural investment criteria is related to problems germane to the specification of objectives (Reynolds, 1966), and this can be addressed with appropriate investment strategies. Pyers et al. (1979) reported that economists or planners could help evaluate alternatives; however they need substantial guidance on the selection and weighing of objectives to formulate investment criteria.

## **2. AIM OF THE PAPER**

This paper proposes a conceptual framework (model) capturing the key factors that influence public mobility in rural areas and local economic activity. The purpose is to develop a generalized process for evaluating the economic impact of rural public transportation, and to use it to define future mathematical structure that will provide a basis for a simplified local share of elderly expenditures in Alabama counties.

## **3. REVIEW OF LITERATURE**

The review of the literature on the topic of evaluating the impact of rural transit-dependent riders (RTDR) benefits found a wide documentation on highway investment and rural economic development. The studies available can be classified into three key areas. The three key areas are: highway investment/expenditure; rural economic development, and economic impact of rural transit services.

### **3.1 Highway Investment/Expenditure**

Investing in highways has often been viewed as catalysis of change and an effective economic development strategy, particularly for underdeveloped rural areas (Appalachia, 1982).

The impact of transportation infrastructure on rural economy and investment is a complex issue; it enhances development and also has its potential risks. Brown (1999) acknowledged that there are maintenance burden and potential risks to rural communities concerned. Peckham and Isserman (1994) also noted the potential in the maintenance of highway infrastructure. Highway maintenance expenses can be burdens to counties that have fewer funds to pay for infrastructure upkeep. Underdeveloped counties may be vulnerable to maintenance costs of highway infrastructures. Also, evidence exists in support of unforeseen risk and evolving "sprawl" in rural areas (Peck, 1991). In support of location theory by Alonso (1964) originated by von Thunen (1842), people tend to locate farther from high-density areas because of the related high cost of living, however highway investment has great potential to open up economic growth and redistribute development opportunities in the counties. While Peckham and Isserman (1994) have particularly argued the macroeconomic benefits of increased highway investments, Peckham and Isserman (1994) noted concern on the upkeep of highway infrastructure. It was also reported that off-interstate counties benefit little from major interstate highway investment in contrast to greater benefit often anticipated. Further, Rephman (1997) reported the

short-term highway economic effects as opposed to longer-term post-highway construction effects. The study revealed that highway infrastructure greatly benefits rural economy mainly in the short-term.

### 3.2 Rural Economic Development

Georgia DOT, Office of Materials and Research evaluated the economic impact of rural public transportation within the counties. The report identified various factors considered highly sensitive to the use of public transportation investment. Also reported is positive relationship between economic development and rural highway expenditure. Improved highway infrastructure have been linked to growth in local rural area's economic activities. Implicitly; it could also bring higher incomes for workers and more revenue/ profits for local investors. The authors also proposed methodologies for qualifying a multiplier effect for rural transit and economic activity (Myer et al., 1996). Similarly, Huddleston and Pangotra (1990) earlier examined and reported on regional and local economic impacts of highway and transportation investments. The impact assessment presented identified an array of local economic variables- such as educational programs, job opportunities that could be enhanced by rural transportation investment.

Sullivan (1990) using input-output methodology, reported both the direct and indirect user benefits of transportation infrastructure investments and rural economic development in the coastal regions of the Western part of United States.

Other literature, including that of middle Georgia Regional Development Center reported the Economic Impact of Rural Public Transportation and enumerated the links between public transit and economic development in rural counties.

Anderson, Anderstig and Harsman (1990) examined relationships between infrastructure and regional productivity in Sweden and identified specific variables that are positively correlated to regional productivity. The study correlated with earlier views of Alonso (1964) and Appalachian (1982) that highway infrastructure investment exerts positive influence on economic productivity. Peckham and Isserman (1994) have documented that highways have "network properties" that are both spatial and economic in nature. Using a quasi-experimental matching method to examine the effects of highways on counties, economic growth of counties is greatest for those close to large cities, while rural counties have limited benefits.

Similarly, Howe (1994) reported that "there is a growing recognition of the link between infrastructure investment and sustainable long-term economic growth. 'New growth' theorists in economics argue a strong correlation between the level of net public capital spending and the level of private sector output and labor productivity growth. It emphasized the potential for infrastructure investment to play a leading role in facilitating faster rates of economic growth."

### 3.3 Economic Impact of Rural Transit Services

Munnell (1990) examined the regional economic development and performance related to public infrastructure. The findings revealed that the probability of a business choice of location and that performance depends on its entity. The authors reported that the choice of a specific location depends on whether the business is a branch firm or a simple establishment firm. Munnell (1990) also indicated that highways have greater effect on economic productivity. He also suggested the need for further research to assess regional output as related to understanding of business choosing location.

Forkenbrock (1990) putting transportation and economic development in perspective using qualitative descriptive analysis presented positive relationship between a vector of factors and economic change and development at the county level. Apart from use of descriptive analysis, Forkenbrock suggested use of factor and cluster analysis to group counties and estimate economic impacts of rural transit infrastructures. Also, American Public Transit Association (APTA) presented a comprehensive analysis of economic benefits of public transit across the United States. Among the measurable and immeasurable benefits reported are: attraction of new business and related services, increased retail trade and sales, employment or jobs, increased property values and fiscal improvement.

Other literature (Liew and Liew, 1984) have estimated the economic effects of highway investment using input-output modelling. The model estimates the direct and indirect effects of highway investments based in a disaggregated industrial framework. Rephann (1997) evaluated planning theories and transportation modelling including input-output modelling as related to highway management and economic analysis. The author argues that regional economic theory is a useful economic tool and indicated that various regional and extra-regional characteristics significantly influence highway economic performance. However, Rephann (1997) criticised that “input-output adapted for transportation analysis may be impracticable and require data that are inadequate or available.”

### 3.4 Transportation Infrastructure

Transportation infrastructure provides rural residents improved access to opportunities outside the local community. Earlier, Moon (1987, 1988) reported global development impacts of interstate highway within rural communities in Kentucky. The study examined factors that explained development prospects along highway interchanges on rural Kentucky during mid 1980's. Also presented are possible developmental effects for remote and isolated transportation interchange sites.

According to Peckham and Isserman (1994) transportation infrastructure has proven the ability to enhance linkage between people, business and community and it's vital for rural economic development. Transit infrastructure does influence location decisions of households within the community settings.

Using dichotomous choice modeling Peckham and Isserman (1994) confirmed that residential choices and community patterns do attract business and industries and also affects the location decisions of firms. Transportation Equity Act for the 21<sup>st</sup> century (TEA-21) is the single largest public works bill in U. S. history that provided \$175 billion in Federal funding for the Nations most important roads over 1998 to 2003. TEA-21 has also pointed to the benefits of the business sector of improved transport system within rural areas from additions to rural infrastructure.

Conclusively, throughout literature is the recurring evidence, theme and correlation between economic development and transportation infrastructure.

### 3.5 Gaps Identifications from the Literature Review

While extensive literature exists on highway investment and rural economic development; and rural highway expenditures and infrastructure, there is a lack of defined methodology for determining the economic impacts of rural public transportation. In addition, attempts to expand highway-based methodologies to cover public transit expenditures have not been successful. From the review of literature, no study demonstrated a strong causal linkage between a positive economic effect and an agency's economic development assistance.

### 3.6 Issue from the Literature and Focus of the Paper

The main issue that arises from the literature is that rural transit-dependent riders (RTDR) are the major concern of rural transit service. Specifically, the question is: Do RTDR contributes to the counties local economy?

## **4. CONCEPTUAL FRAMEWORK**

Several authors have reported on rural highway infrastructure and its economic impacts, but there are few studies on perceptions on impacts of elderly in the analysis of rural transit systems. Hence, there is conceptually a need to develop a methodology for determining and to evaluate the economic impacts of RTDR on rural public transportation services.

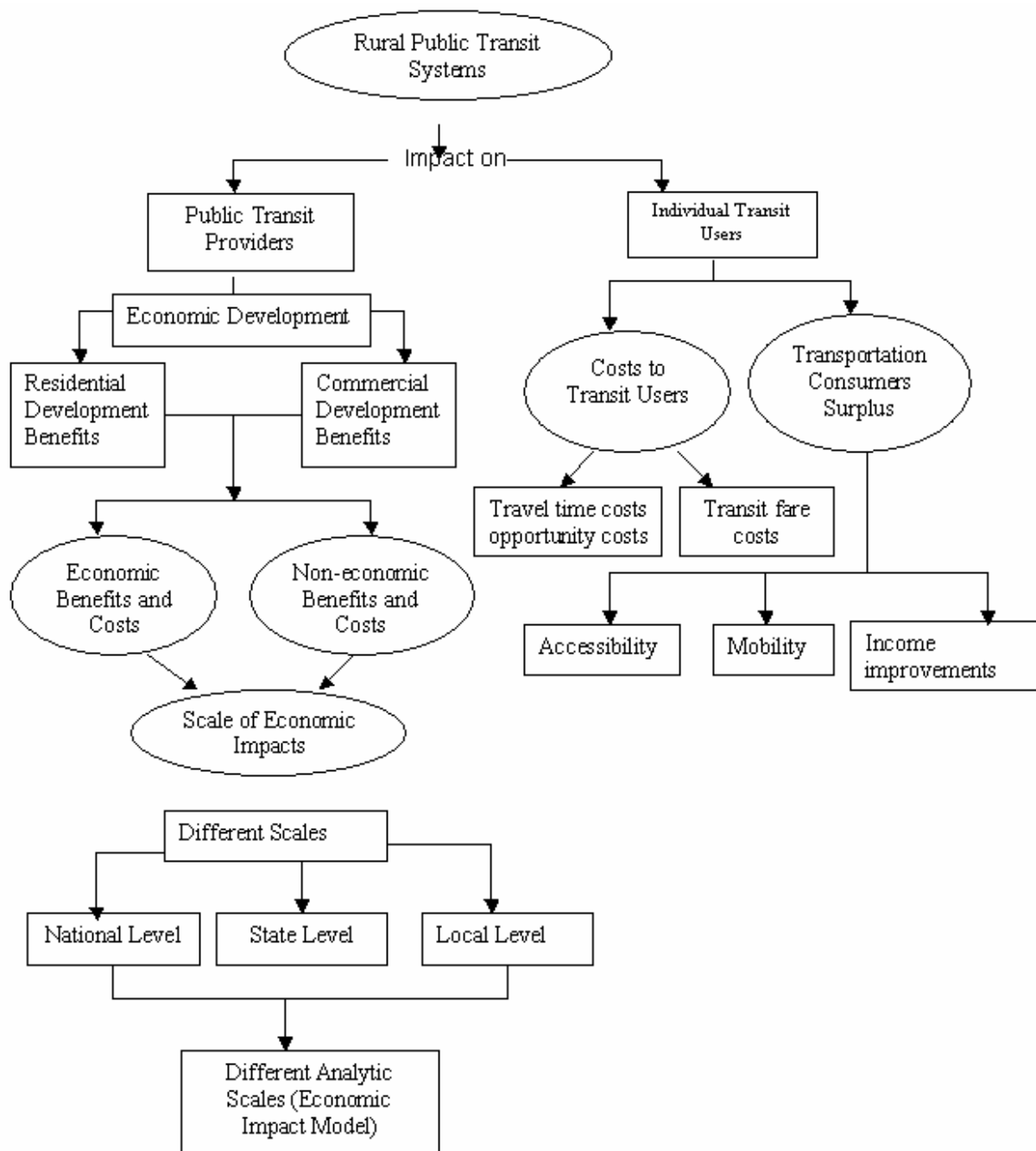
### 4.1 Analysis of Framework

This section discusses two issues surrounding the conceptual framework for evaluating the impact of rural transit-dependent riders (RTDR) benefits in Alabama counties. It analyses the relevance of these issues by drawing on existing research work.

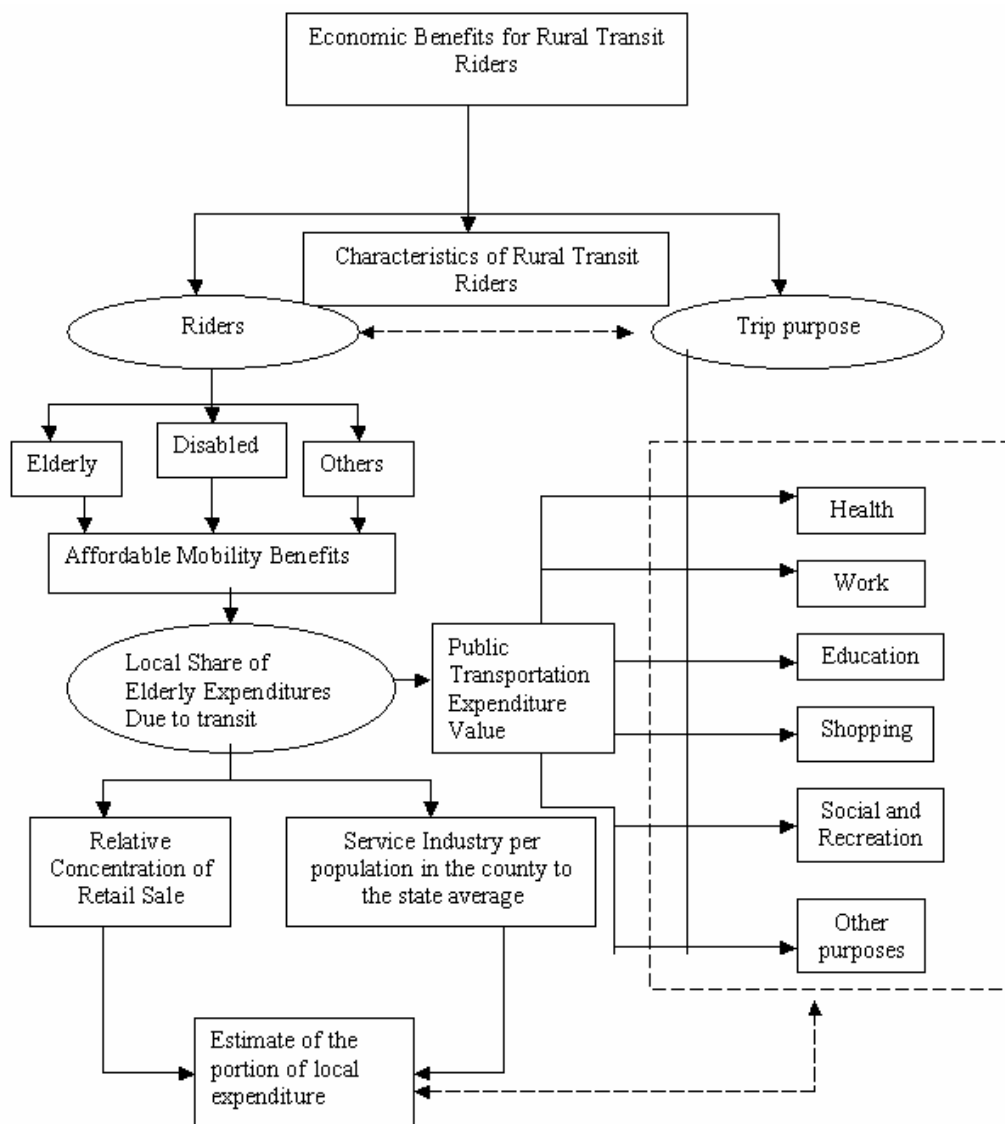
Despite voluminous literature on the appropriate design and improvement in rural transportation investment services, the issue of its economic benefit analysis using modeling remains controversial. A main controversy has been the costs to transits users and concern on the upkeep of some major interstate highways (Peck 1991, Peckham and Isserman 1994). Impacts of rural public transportation services are presented in Figure 1. As indicated in Figure 1 the overall scale impact varies with different perspectives.

In Figure 2 economic benefits of rural transit rider's characteristics can be examined from two main perspectives, that is the riders themselves and important consideration concerning the trip purpose, the characteristics of rural dependant riders are indicated in figure 2. Although the rural elderly riders may be less as compared to their urban counterparts, the economic benefits for these groups of rural reside it is great. Transit alternative to the elderly dependant is few if any. Earlier studies (DOT, 1996; and Jones et al., 1992) have indicated that rural transit users are mostly elderly over 65 years of age are handicapped physically disabled, and dependent due to in affordability and disability. Hence, there is the need to provide public transport infrastructure to maintain the viability of rural counties and relative concentration of retail services in rural communities.

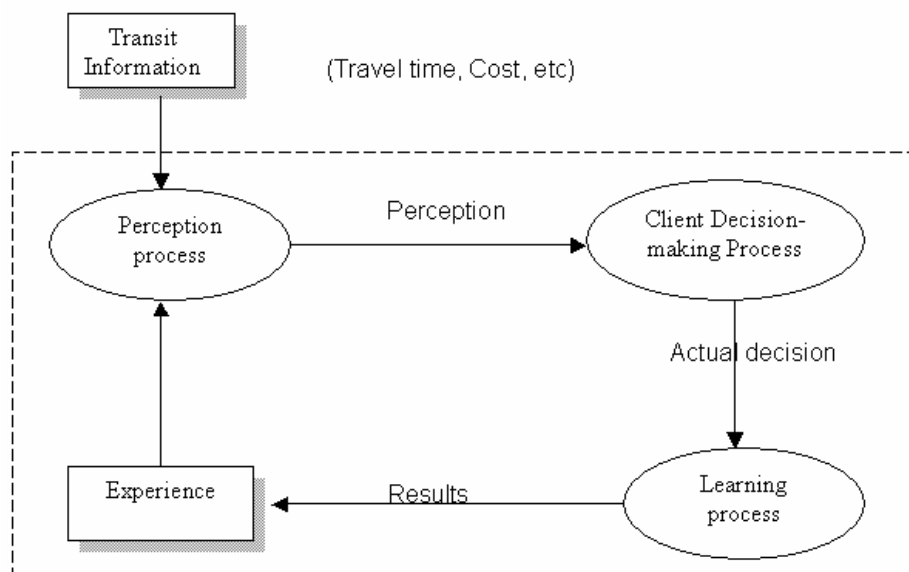
Trips are generally classified by purpose and it's determined by activity the riders are engaged in at the destination. Rural transit rider's trip purpose could either be health/health care, business work, education, shopping, entertainment/social and other unclassified. In context, most elderly rural transit-dependent riders have home as either the trip origin or trip destination otherwise known as home-based trip. In contrast is a non-home based trip. Although work trip has been primary concern of transportation planning for decades both in rural and urban areas, the fact is that the elderly rural transit riders do not engage in much work trips. However, it is expected that medical/health care trips would constitute the major purpose of trips made while work trips would be the least frequent trips in Alabama counties. While trip purposes may change through life span as earlier assumed; transit trip distances for trips classified in Figure 2 need be reviewed.



**Figure 1. Conceptual framework of rural public transportation services.**



**Figure 2. Conceptual framework of evaluating the economic benefits of rural transit-dependent riders.**



**Figure 3. Conceptual model of elderly economic benefits in response to travel time.**

In Fig 3 above, one can see that elderly route choice behavior in response to travel time information involves perception process. When travel time information, in particular travel and opportunity cost is provided, an elderly client will first perceive that information, integrating his/her historical or previous day experience, to form perceived travel time. Then, based on the perception and other factors, he/she decides the travel pattern, for instance, he/she may choose the same route as the previous day. When the trip is over, he/she will review the actual decision, and the results will influence the next trip as a previous day experience. This process is represented in Figure 3 above. Significantly, elderly response to travel times related to fore knowledge of available transit information in term of the expected and the current travel time is information. It is evident that recent experience and the (clients) decision making process do occur alongside a shift in economic benefit perception in many rural economy. Concern about elderly learning process is vital to the outcome of route choice behavior.

## **5. CONCLUSION**

This paper constructs a conceptual framework for evaluating the impact of rural transit-dependent rider's benefits, providing and discussing the relevance of three essential key factors that influence public mobility in rural areas and local economic activity. These essential factors are derived from a detailed review of the existing literature on highway investment and rural economic development.

It is envisaged that the conceptual framework will form the underlying basis towards the development of a more comprehensive model in future. Undoubtedly, Alabama lacks empirical research in this matter. The present study takes the approach of proposing a theoretical framework which can be applied to practical situations in the rural public transportation industry by reviewing available literature such research approach is common, particularly when existing knowledge in the particular area is still somewhat narrow. The present study, hence, contributes to the advancement of the literature on impact of rural transit-dependent rider's benefits.

As mentioned, the present study represents the starting point for more future research. In conclusion, formulation of an investment strategy in United States will therefore require consideration of the impacts of investment on urban and regional development, and analysis of the consequences of investment on related national objectives such as energy conservation or balanced growth.

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