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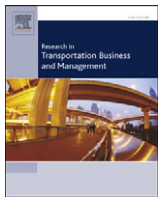

Business strategies and technology for access by transit in lower density environments

Roger F. Teal [a,*], A. Jeff Becker [a,1]

[a] DemandTrans Solutions, Inc., 1000 Skokie Blvd., Suite 350, Wilmette, IL 60091 USA
[b] Regional Transportation District, 1600 Blake Street, Denver, CO 80202 USA

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ABSTRACT

Providing access via public transport in relatively low density suburban environments has been a difficult business challenge for transit operators for the past 40 years. A family of services approach to this problem, a key element of which is providing demand-responsive services, has proven effective for some metropolitan public transport authorities in the USA, of which the Denver authority is notable. The Denver agency has devised innovative service delivery modalities for its DRT services—which range from many to many dial-a-ride operations to structured DRT services to flex-route services—and has also sponsored the development of a technology platform that enables these services to be delivered with appropriate levels of automation and functionality. A set of business principles that linked technology enablement to cost-effective flexible transport services guided these developments. The Denver public transport authority's experiences are used to illustrate the relevance and viability of this approach to supporting transit accessibility.

1. Introduction: The business problem of public transport in lower density environments

Providing access via public transport in lower density—usually suburban—environments has been a difficult business challenge for transit operators in the USA for the past 40 years. Such service environments are typically unfriendly for conventional fixed route public transportation, characterized as they are by dispersed travel patterns, poor street connectivity, and high levels of automobile availability, resulting in much lower levels of public transport demand than in areas closer to the metropolitan region's core. Substantial public subsidies are typically required for any public transport service to be provided in these environments, and often there is no "economic" level of service—except no service whatsoever. But that is rarely an option for the public transport authority, as there are strong political imperatives to provide suburban service, since the local public financing system for metropolitan public transport typically relies in important part on taxes paid by suburban residents. Moreover, there is a core group of residents who require public transport services, transit dependent persons comprised of those who lack routine automobile access or cannot drive, primarily the low income, older residents, and the young. Hence there is a further policy imperative to provide service in these environments.

From one perspective, the business challenge for public transport is similar to that confronting any passenger transportation service, namely to supply those services that most economically meet passenger demand, taking into account both the supply attributes of particular service options and the nature of passenger demands. Such demands are of two types, with some passengers in lower density travel markets making purely local trips, whereas others need to connect to a regional scale, line-haul transit service in order to access their ultimate destination—but with the local access element representing an essential part of their overall trip.

Complicating the business aspects of these service provision decisions, however, is the reality that virtually all public transport service *within* lower density environments will generate ridership at levels that will be insufficient to cover service costs—and the gap between costs and fare revenues is likely to be quite large—although regional scale line-haul services traversing lower density environments may generate substantial patronage at the access points to those services. Hence the problem facing public transport authorities is to determine how much, and what type, of service to provide given the limited public subsidies available.

In this paper, we first consider how other transportation operators have approached the problem of service provision under financially constraining circumstances, and the generic lessons that can be derived from these experiences. We then discuss the application of these lessons to public transport provision in low density environments, using as a specific example the Denver metropolitan region in the USA. The use of demand-responsive/flexible services as a strategic solution approach is then examined, including how such services have been used to achieve the Denver public transport agency's business

* Corresponding author. Tel.: + 1 847 256 8866.
E-mail addresses: rteal@demandtrans.com (R.F. Teal), jeff.becker@rtd-denver.com (A.J. Becker).
[1] Tel.: + 1 303 299 2148.

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objectives. The use of technology has been a key element in this business strategy, and we describe how the technology platform that supported the demand-responsive services was designed and implemented in a fashion aligned with business objectives. We conclude with implications for managerial practices.

2. Fundamental approach to the business problem

As carriers in multiple transportation industries have demonstrated, effective strategies exist for handling the problem of service provision under significant financial constraints, and most or all of these strategies are relevant to public transport as well. The overall approach includes specific strategies for bending the cost curve downward for service provision, and for maintaining essential service levels while doing so, as well as strategies for using technology to displace or shed costs. There is a recognition in this approach that trade-offs are essential, and that consumers will need to adapt to a service situation which may not be ideal from their perspective—but by doing so they will continue to have access to a reasonable level of service at a reasonable price.

It is our perception that this overall approach has been used, in a notable and instructive manner, by the airline industry in the USA during the past decade, particularly by the so-called network carriers who (with the noteworthy exception of Southwest Airlines) largely dominate that industry. The network carriers have faced severe business challenges during the past decade, and in order to financially survive have evolved from operations providing a relatively uniform level of service to a more multi-tiered service model. They have essentially abandoned a business model in which medium or large jets were operated in all markets by a single operating entity and many services were bundled together into a single ticket price. Now, as many as 45% of a network carrier's scheduled flights may be flown by smaller "regional" jets of 50 to 90 passengers, most of which are operated by regional airline(s) under contract to the network carrier. The operating cost of regional jet service is significantly less than for the (larger) planes operated directly by the major airline's work force, in important part due to lower labor costs. Larger jets are now used only on routes with denser traffic, and airlines have focused on providing no more capacity than absolutely necessary to serve the market and to remain competitive. The technology of yield management systems has enabled airlines to manipulate fares and manage capacity to sell essentially every seat on many flights. Passengers are often travelling in smaller planes (albeit jets) than they would prefer, and at unprecedentedly high load factors, but the overall frequency of service has remained relatively high.

Technology, in particular Web-based reservations and trip information systems, have been integral to the airlines cost reduction efforts, as the airlines have made huge reductions in the cost of commissions and trip booking operations. The customer base has responded favorably to this technological innovation, and even found advantage in the self-service approach compared to the agent-based booking system that was virtually universal merely 15 years ago.

In addition, the USA network carriers have almost totally unbundled their service offering. Passengers must now pay fees for virtually every service not directly associated with the movement of the airplane from point A to point B. Clearly, customers have not been pleased with many of these service configuration and service pricing changes, but the frequent travelers upon which the industry relies have largely adapted, understanding (albeit grudgingly) that the nature of the flying experience has changed. It bears emphasizing that this strategy has returned the USA airline industry to somewhat profitable operations (Center for Asia Pacific Aviation, 2010).

The relevance of these airline industry experiences is that many of the same strategies have been urged upon the public transport industry during the past 30 years—service contracting, tailoring vehicle capacity (and service costs) to market demand, more demand-responsive services, non-uniform pricing and more self-service ticketing options, improved customer information systems. However, few public transport authorities in the USA have systematically deployed such approaches. Hence the necessity of turning to other transportation sectors to see compelling and widely adopted examples of this business strategy in action. Those experiences suggest the following strategic approach to the difficult challenge of providing public transport service in lower density environments.

- The simple availability of a relatively frequent service providing transport from point A to point B is what is essential, and the specifics of the service offering-in terms of capacity, amenity, etc.—are not as important (albeit within bounds).
- Capacity should be tailored to closely match demand by whatever mechanisms are appropriate to the service and market situation (smaller vehicles, demand-driven services, etc.).
- The operating cost curve can—and must—be lowered by using strategies such as contracting out some services to lower cost providers and/or using smaller vehicles that cost less to operate.
- Technology should be used to shed or reduce as many non-core operations costs as possible, and devolve as many functions as possible to service users, thereby reducing overall service production costs.
- Information technologies focused on customers can provide access to the transportation services much more simply, easily and conveniently than ever before. Technology greatly reduces the difficulty of obtaining public transport information and consummating the decision to ride; it can also serve as partial compensation for loss of customer amenity in other areas.

3. Application to public transport: The family of services approach

In considering the application of these lessons to developing a business strategy for the provision of public transport in lower density environments, 3 major questions are pertinent.

(1) What are the markets or demand?
(2) Should service be provided to any specific market segment?
(3) If so, how much service, and what type of service, should be provided?

In general, the appropriate objective for a public transport authority is, for each sub-market that it serves, to maximize ridership given a certain level of public subsidy. Alternatively, this objective can be expressed as minimizing subsidy per passenger trip in each sub-market. Different types of services—the so-called family of services—can be provided, with each having different service production costs, level of service, and achievable service productivity. These services can span a spectrum from rail operations to buses to low capacity fully demand-responsive services.

The challenge to the public transport authority is to select the specific type of service that will achieve the best balance between subsidy per trip, service availability, and productivity in a particular travel market segment. In making such decisions, the public transit authority also must consider that in an environment with dispersed travel patterns, it is often important to connect services together in a network to best accommodate demand and an equitable metropolitan distribution of services. Moreover, it is essential that level of service be carefully matched to demand to further the objectives of financial performance and sustainability. In general, as service productivity—defined as boardings (passenger trips) per hour—increases, cost-effectiveness will also increase and subsidy per boarding will decrease. Given a budgetary constraint, the objective is to minimize subsidy per boarding while also increasing boardings per hour.

An example of the application of this approach is the family of services employed by the Denver Regional Transportation District (RTD) in lower density environments, which range from conventional