The Service Productivity and Quality Challenge

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Chapter 17  Postal Service in the Nineties

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1. Introduction to the Nature of Postal Services

Postal service is big business. Consider the United States. The United States Postal Service handles over 40% of the world’s mail, with a work force of over 700,000 and with revenues of nearly $50 billion. Over the years, the Postal Service has moved from a department of government to a public enterprise organization, and is introducing high-tech equipment with further changes in progress. At the same time traditional postal service is facing competition not only from other types of delivery services but also from electronic communications. Competition has been made stronger by advances in microelectronics, telecommunications, and computers. Postal service will need to respond to the competition by adopting new technologies, being more flexible in its pricing and product mix, addressing issues of quality in part by using quality to differentiate its products, and by pricing efficiently. This paper will begin to address such issues by drawing upon the recent literature on competition and sustainability of natural monopoly.

Modern postal service was originally recognized by Rowland Hill (1837) as presenting complicated organizational problems. It is a chain of activities consisting of collection, mail processing (e.g., canceling, and sorting), transportation, and final delivery. Traditionally, these activities have been highly labor intensive with horses giving way to vans and the railroad being supplanted by the airlines for long distance mail carriage. Such advances as occurred took place primarily in suppliers to postal service. Processing mail,

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especially sorting, was a highly labor intensive activity, with around 80% of the U.S. Postal Service's expenditures being accounted for by labor. However, with technological advances postal service has started to adopt high tech methods of mail processing. These include methods of coding, such as barcoding, together with optical character recognition and remote video encoding devices, which have the potential for speeding up sorting and other mail processing operations. We illustrate some of the potential and effects of technological change by reference to the United States Postal Service's plans for automation for 1995, the so-called ABC (Automated Barcoding) environment. Our Figure 1 is a simplified illustration of how technological innovations are being incorporated into postal service, at least for large facilities.1

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1 In this simplified illustration, we confine our attention to sorting of originating mail and destination mail, ignoring earlier steps in the processing of mail, e.g., facing and canceling.
Consider Figure 1. The arriving (canceled) mail is fed either into a multilane optical character reader (OCR) or a barcode sorter depending upon whether it is pre-barcoded or not. Letters without barcodes are fed into an OCR. The OCR puts a barcode on every piece of mail. Three streams of mail emerge from the OCR. One stream goes to "incoming" sorting which consists of all the mail to be sorted for delivery by this (originating) center. Another stream goes directly to transportation to other centers and offices. Another stream goes to the barcode sorter, while a final stream is rejected, because the OCR is unable to read all of the mail passing through it. Ideally, the vast majority of the mail fed into the OCR is read correctly and gets a barcode put on it. However, mail that is rejected is sent to a new technology, known as remote video encoding. This technology employs innovations in computer technology and telecommunications. It starts by placing an identifying mark on the letter by "lifting" an image of the address and storing in a computer. The computer then attempts to read the images that have been stored. Any images which the computer cannot read completely are then stored by the computer until they can be transmitted to a remote key-board operator who then completes the address. Successful completion of this operation results in a barcode being placed on the letter. The breakthrough with this technology is its use of computers and telecommunications. These make it possible to process OCR rejects much more cheaply than using conventional methods. The potential cost savings stem from a number of sources. Labor costs are likely to be lower, because operators do not require the training and "scheme" knowledge of existing operators of say letter sorting machines or manual sorting. In addition, the video center can be located where labor is cheaper and it can be contracted out thus avoiding the employment of potentially high priced postal union labor and potentially gaining the benefits from competitive contracting. It is even possible that such work might be performed at home on personal computers.

Returning to Figure 1, letters with barcodes are then sorted by the barcode sorter and either routed to the appropriate transportation mode or placed with the mail processing center's destinating mail for sorting by the barcode sorters to the individual carrier routes. Ultimately this will result in mail being sorted in walk sequence for each carrier. How this might operate is shown in the lower part of

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2. The OCR operates at a very high speed, (around 10 letters per second) reducing its ability to read addresses that are not clearly typed.
Figure 1. All mail arrivals are assumed to be barcoded. Some of this mail consists of destinating mail from other offices while some of it originated in this office. The mail is first sorted to post office or 5 digit Zip code. Further sorting of the mail requires a sorting scheme. The scheme has to operate within the constraints of the hardware. For example, it would take too many bins to sort the mail to carriers and then sort to walk sequence for each carrier. Instead a scheme like the one in Figure 1 is required. Here the mail is first sorted according to "stops" where a stop is just that, each stop on a carrier's route whether it be an apartment house, office or residence. Thus, a first pass is made at the end of which bin i will contain the mail for stop i for each carrier. A second pass is required that will then sort each bin to carrier route in walk sequence. Notice that the first pass can be performed a number of times but the second pass can only be performed once just before the carrier is about to set out on his route.

While these kind of changes in technology will result in a net reduction in costs for postal services, they will create additional problems. Not least is the creation of a new and apparently very inflexible peak at the second pass of the sortation to carrier route in walk sequence. One effect of this may be to drastically reduce the benefits from destinating sorting at off peak times since only first pass sorting can be done at this stage. In addition, the gains from having customers to prebarcode is likely to increase relative to the gains from having them presort mail. This raises questions of appropriate discounts for such customer co-production activity. Finally, issues of capital recovery associated with the much more capital intensive environment of postal services will present major new challenges in the nineties.

In addition to coming to terms with the implications of technological innovations, postal administrations have to face increased competition. For example, mail may be "presorted" by private firms, which are, in effect, competitors of the postal administration in providing this element of overall postal service. The presorting may take on various forms. It may be sorted completely so that the carrier does not even have to sort it himself for his walk. In this case, the presort supplier would likely drop the mail off at the destinating office. However, as the postal authority itself begins to develop more and more sophisticated forms of sorting, such as that described in Figure 1, the value of presorting may be reduced. Indeed, it may be more valuable to have mail prebarcoded in such a system, but leave all sorting to the destinating post office in the postal administration. Thus, new technologies might not only eliminate the
need for the carrier to sort the mail for his walk, but also reduce the value of the output provided by competitors such as presort companies. Normally a significant part of a carrier's day is spent in the office sorting his mail in readiness for his walk with the potential for significant labor savings. Similarly, traditional presort discounts may have to be reduced and barcode discounts possibly increased. Such changes will have a significant effect on the way postal services and their competitors do business. Not only will they result in the obvious substitution of capital for labor but they will necessitate changes in pricing policy in determining appropriate discounts for customer co-production activities, such as presorting and pre-barcoding, which compete with similar services provided by the postal administration.

Competition in postal services extends well beyond co-production activities, of course. Competition from courier services and facsimile transmission services (FAX) have already had a substantial impact on postal services. Private delivery services such as Federal Express, United Parcel Service, TNT, Airborne and DHL, are clearly strong global competitors. Similarly, facsimile transmission competes with both first class letter mail as well as courier services. Fax machines have lower marginal costs than traditional mail services and enjoy the added advantage of being able to interface with computer terminals directly, and are growing in appeal. Commercial FAX business alone accounts for over $5 billion annual turnover.

European nations face significant competition in the area of international mail, where inefficient rates, built in cross-subsidies and problems with service quality have opened the door for entry by competitive express carriers. This has also led to such services as remailing, in which, for example, mail destined for country A and mailed in country B is routed through country C in order to take advantage of inefficiently low rates (in the form of "terminal dues payments") between countries C and B.  

Another area of growing competition is electronic mail (E-Mail). Significant cost savings can result from E-Mail services. For example, one-page transmissions can be 10-540% cheaper than the equivalent transmission utilizing FAX. Longer reports offer even greater economies. The current problem of interaction between local area networks and public carriers, and increased costs

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3 For details on international competition, see Crew and Kleindorfer (1992a, 1992b).
for transmissions along complex routings, have prohibited E-Mail from currently making greater impact on postal services. However, this may be expected to change given the underlying economies of E-Mail for computer intensive customers.\footnote{Adie (1989) has argued that about half of today’s first-class mail could be transmitted via some form of electronic transmission (see Adie 1989), so that E-mail and FAX competition will only grow. In addition, there is potential competition by banks in electronic funds transfer. Indeed, in Europe a much larger proportion of bills are paid through banks directly rather than the popular method in the U.S. of mailing checks.}

Without a doubt, postal services are facing significant competition and technological change. The issue of how postal services should react to the influx of competition is an open, but vital question. Increasingly, postal regulators have answered this question with a pro-competition policy, including encouraging the commercialization of the postal administration in the areas of technological innovation, service quality and new services to allow the postal administration to compete effectively. Two basic questions which arise in implementing this policy concern the definition of “efficient entry” and the management of service quality and innovation. The economic foundations of these will be the subject of our next two sections.

2. Natural Monopoly, Efficient Entry and Sustainability

Postal service has traditionally been and, with few exceptions, still is provided by public enterprise vested with a statutory monopoly. Even in Britain where extensive privatization has taken place under the Thatcher governments, the British Post Office remains one of the few public enterprises with a guaranteed but weakening statutory monopoly. In Germany the Bundespost continues as a public enterprise with a statutory monopoly in both post and telecommunications. While there are no obvious signs that the public enterprise monopoly is going to be replaced soon, the Bundespost has demonstrated an awareness of competition and has already taken steps to divide its operations into business units, which provides the potential for mitigating cross subsidies and, where efficient, promoting competition and/or privatization. Similar signs of...
"commercialization" of postal services are visible elsewhere (Dobbenberg, 1992). However, postal service plays such a key role in the economy that it is critical to ensure that such commercialization activities do not undermine the viability of an efficient postal service nationally and internationally. This is especially important if the requirement of universal service within a country is imposed with a uniform tariff. If there are economies of scale or scope in the delivery of postal service, then universal service at uniform rates may, under certain circumstances, promote entry by competitors with resulting erosion of these scale and scope economies. This is one of the central issues confronting postal administrations worldwide and it will be a focus of our analysis in this section.

We begin with a discussion of the related notions of "natural monopoly" and "sustainability", drawing upon the earlier work of Elizabeth Bailey, William Baumol, John Panzar, and Robert Willig. Their analysis was motivated by the entry that was starting to take place in telecommunications in the seventies. Many of the same issues of efficiency and network access carry over into postal service today.

Is postal service a natural monopoly and, if so, should postal administrations enjoy protected franchises? While this issue has not been definitively settled, empirical and conceptual analysis of this issue have led several to argue (see, e.g., Owen and Willig (1983) and Panzar (1991)) that the local delivery network in postal service has the clearest claim to being a natural monopoly, just as the local exchange network does in telecommunications. Other aspects of postal service do not appear to exhibit the required dominant economies of scale or scope required for a clear claim to monopoly status. If this continues to be so under the technological environment of the future, then competition in other functional areas (collection, sorting, etc.) of postal service could add significantly to postal efficiency. It would remain only to protect the viability of the overall postal network (to assure continuing universal service) and to assure open and equal access for all competitors to the local delivery network, which would continue to enjoy protected franchise status, at least for addressed letter mail distributed by mail carriers. In this context, equal access means that all competitors, including the postal administration, would pay the same per unit price for use of the local delivery network, with prices possibly differentiated by service class.

5 For a comprehensive treatment of sustainability see Baumol, Panzar, and Willig (1988).
Multi-product issues and economies of scope are especially important in understanding the long-run sustainability of monopoly if entry is allowed into the monopoly sector. In a single-product world, if a natural monopoly is truly "natural," it is the dominant form of organization and its scale economies are such that competitors cannot undercut it. Its price would be sustainable against entry.\(^6\) We illustrate this in Figure 2. As long as the competitor's average costs \(AC_c\) exceed the monopoly price given by \(P_m\), the single-product monopoly is sustainable against entry by competitors. Attempts by regulators to lower the price below \(P_m\) will make the industry even less attractive to potential entrants. Thus, in the traditional single-product case, sustainability of natural monopoly is not an issue.

\[\text{Figure 2: Illustrating Sustainability}\]

\(^6\) Panzar and Willig (1981) provide a more rigorous definition of this and also show that economies of scope exist if and only if the cost function in respect of the input shared by each output is subadditive.
Contrast this with the multiproduct monopoly where subadditivity and/or economies of scope exist. Here prices may be set, we assume by the regulators, such that entry to some markets becomes attractive. In this case the monopoly would not be sustainable against entry. Sometimes the reason for entry is obvious, namely that some prices are set too high in order to subsidize other prices. Cross-subsidization, however, is not the only reason why prices are not sustainable. Indeed, as Faulhaber (1975) has demonstrated, it is possible for a cost structure to be subadditive and yet, in the absence of regulation, it is not possible to have a set of prices that are sustainable. A natural monopoly is called sustainable if there is some break-even price vector which will not attract entry from a competitor using the same production technology as the monopolist. Sustainability is a central concept in understanding when entry restrictions are required in order to garner scale and scope economies associated with a natural monopoly. As discussed above, this is especially important for multiproduct firms like postal administrations which use common inputs. It can very well be the case that every allocation of common costs leads to some subset of product paying more than the cost of producing the given subset independently. In such a case, there would clearly be incentives for competitive entry, and the monopoly in question would not be sustainable. As noted by Baumol, Bailey and Willig (1977), this does not mean that the monopoly could not ward off entry by adjusting its price-output configuration. Unsustainability of a given price vector simply means that the price in question will attract entry. If there is no sustainable price vector, there is arguably a case for entry restrictions.

Interest in sustainability issues has gained momentum with recent deregulation moves, both in telecommunications and postal service, which have been directed at encouraging dynamic efficiency and productivity by allowing competitive entry into some of the markets of the multi-product monopolist. Let us first consider an example, based on Panzar (1980).

Consider the following cost function for a 2-product firm, e.g. a postal administration offering two classes of mail service:

\[
C(X_1, X_2) = F + C_1X_1 + C_2X_2
\]
This cost function exhibits both economies of scale and scope. Suppose demand for the two products is independent, i.e., \( X_i(P) = X_i(P_j), \ i = 1, 2 \). We represent in Figure 3 the locus of zero-profit points such that

\[
\Pi(P) = \sum_{i=1}^{2} \left(P_i - C_i\right) X_i(P_i) - F = 0 \tag{2}
\]

Similarly, let \( P_i \) represent the lowest price at which a stand-alone firm (using the same technology (1)) could break-even, i.e.,

\[
\bar{P}_i = \min \{P_i \geq 0 | (P_i - C_i)X_i(P_i) - F\}, \quad i = 1, 2 \tag{3}
\]
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From Figure 3, it is clear that the only break-even price vectors which could be sustainable lie on the locus $DE$. In fact every price $P^m$ on $DE$ is sustainable since (we assume) an entrant must set prices to attract any demand. However, any such price vector would clearly allow the entrant only to make losses. Moreover, any price vector to the right of (resp., above) could easily be challenged by a stand-alone firm marketing only product 1 (resp., only product 2). Thus, the locus $DE$ is the set of all sustainable prices for this example. For reasons discussed below, we are particularly interested in whether the Ramsey optimal prices are sustainable (point $B$ in Figure 3). From (2), it is clear that $P_1^* > C_1$, $i=1,2$, so that the Ramsey solution clearly lies on the locus of $DE$.

Thus, in this case, the Ramsey solution is sustainable.

As it turns out, a somewhat stronger property holds, even under more general cost conditions. Baumol, Bailey and Willig (1977), hereafter BBW, point out that for a monopolist to ascertain that price-output vectors other than the Ramsey solution are sustainable may require "global information about demand and cost functions for its products" (BBW, 251). Thus, when the Ramsey solution is sustainable, it may be the only safe bet for the monopolist to thwart competitive entry, if such is allowed. In this sense, one may think of entry threat to a monopoly as a "weak invisible hand" (BBW) inducing efficient (Ramsey) pricing. BBW establish general conditions under which the Ramsey solution is sustainable.7

For the postal context, perhaps the most important lesson to be taken from this discussion is that to the extent that the local delivery network for letter mail remains a natural monopoly it may be necessary to protect this monopoly from inefficient, cream-skimming entry and, for reasons of universal service, to assure the continuing viability of the overall postal administration as an end-to-end service provider.8 It will also clearly be important to promote competition in those areas of the postal value chain other than the local delivery network, where this will not significantly affect the viability of the postal administration as an

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7 These are that: the services be weak gross substitutes, that the cost function exhibit decreasing average cost along every ray, and that the cost function be transray convex (which implies economies of scope).

8 See Dobbs and Richards (1992) for further discussion.
end-to-end provider of postal services. How this might happen is the next focus of our attention.

As explained in the previous section, postal service may be viewed as a chain of interconnected services: collection, facing, sorting, transportation, etc. Each of these vertically aligned services are required in order to complete one full unit of postal service. A fundamental question in this context concerns whether various entrants will be allowed to compete in providing subsets of the total set of services required for full postal service. For example, will entrants (either separate service bureaus or postal customers themselves) be allowed to collect, sort and deliver mail to the final delivery zones, leaving final local delivery to the postal administration? If so, what discounts off full mail service should be granted for the subservices supplied by these entrants? This issue is at the heart of the question of sustainability and competition in postal services raised above.

If discounts are set too high, then inefficient entry will occur by service providers of these discounted services who are responding to the large discounts in setting up operations. This loss of business to the postal administration may not just erode revenues but it may represent real losses in economic efficiency to the extent that the postal administration could do the same service more cheaply than some of the entrants. The resulting losses in revenue and volume, together with the remaining universal service obligation, could severely damage the viability of the postal administration.

On the other hand, if discounts are set too low, then otherwise efficient competitors will not enter the market place and the postal administration will be providing services which could be provided more cheaply by these competitors. This could discourage such activities as pre-barcoding by business customers who could barcode and presort their outgoing letters rather easily for large mailings if they had a reasonable incentive to do so. The lost economies from failing to accomplish these activities could clearly be significant, especially since the vast majority of mail in most countries is sent by business customers.

Recent research suggests a solution to this problem. We review here a simple version of the model suggested by Panzar (1992). In this model, we assume two services, which are substitutes for one another. The first is "full service" and the second is "basic service." We think of full service as entailing all service steps required for the basic service (e.g., local delivery) plus some additional, separable services (e.g., collection, barcoding, presorting). In a simple two-stage model of postal service, we can express this relationship as
FULL SERVICE = BASIC SERVICE + SEPARABLE SERVICE

We imagine in this model that the basic service is imbued with natural monopoly characteristics, while the separable services do not enjoy clear advantages from monopoly provision. If the marginal cost of the separable service for the postal administration is c/unit, then Panzar argues that the postal administration should offer a discount off full service of c/unit if only the basic service is used. Thus, assuming a break-even constraint, the price for "full service" would just be the average cost of providing full service, and the discount for entrants who only use the basic service would be equal to the marginal cost which the postal administration avoids if it provides one unit less of the separable service. As long as the postal administration is not challenged by entry into the basic service market, no sustainability issues arise. Interpreting basic service here as local delivery service, we see that the implication of this logic is that monopoly services (e.g., access to the local delivery network) should be priced at average cost (thus assuring full cost recovery), while separable services (prebarcoding, presorting, etc.) should be priced at the average-cost tariff minus a discount equal to the marginal cost of providing these separable services. This provides precisely the correct entry signal to potential competitors. Those which can perform the separable services less expensively than the postal administration will enter and those which cannot do so will purchase these separable services from the postal administration. Because this scheme prices components of the postal value chain to encourage entry only when it is efficient, we follow Baumol (1991) in referring to this scheme as "efficient component pricing".

An important aspect of efficient component pricing is that all participants in the postal services market, including the postal administration, face the same "price" for using the basic service. In this sense, efficient component pricing may also be thought of as "equal access pricing" for use of the local delivery network. As Panzar (1992) points out, under equal access pricing, while access charges for the basic service should be nondiscriminatory with respect to competitive service providers, they may vary across classes and categories of mail. In particular, in a multiproduct version of the above efficient component/equal access proposal, prices for access charges to the basic service could and should be set by the traditional Ramsey rule, described more fully
below, to recover total costs. According to this rule, those classes of mail with lower price elasticity of derived demand (i.e., the demand faced by the postal administration) for basic service should be charged higher prices for use of the local delivery network (the basic service in the model above) even though the local delivery service provided to those different classes of mail might be indistinguishable.

An example, suggested by Dobbs and Richards (1992a) may be useful in illustrating the approach proposed by Baumol [1991], to which we will henceforth refer as "Top-down Efficient Component Pricing" (TECP). Under TECP, the discount of each link in the postal value chain for each class of mail is set equal to the LRMC (or avoided long-run marginal cost) of processing a unit of mail according to the service standards of the indicated class in that link of the postal value chain. We call this "Top-down" because the reference point against which discounts are set is the price of the highest cost class (First Class mail) required to make the entire price structure break even.

In this highly simplified example the price charged by a postal authority for drop-shipment of mail at the local delivery network would be derived as follows:

<table>
<thead>
<tr>
<th>Class of Mail</th>
<th>Price Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Class mail</td>
<td>( P )</td>
</tr>
<tr>
<td>First Class presort</td>
<td>( P_p = P - m )</td>
</tr>
<tr>
<td>Drop-ship</td>
<td>( D = P - m - t )</td>
</tr>
</tbody>
</table>

We use the following notation in the above:

- \( m \) = avoided cost of presorting
- \( t \) = avoided cost from drop-shipment (e.g. savings in transportation)

In the above TECP scheme, the process begins with specifying \( P \), the price of First Class mail. \( P \) is chosen so that the authority breaks even when other prices are determined from the above TECP scheme and the cost structure of the postal authority. This particular implementation of TECP enjoys several desirable properties. First, it is relatively transparent for regulatory purposes. Second, it has desirable entry signalling properties, in that only entrants with lower costs than the postal authority will have an incentive to enter various activity segments. Finally, this implementation is conservative relative to the financial viability of the postal authority, in that it places the total responsibili-
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Of mail with by the postal for use of the though the aim might be be useful in we will ECP. Under class of mail processing as in that link reference points (First Class authority for as follows:

However, the price structure evolves as the product mix changes over time. The price mechanism is shown in a simple graph where the supply and demand curves intersect at the market-clearing price (P) when other factors of production are held constant.

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economy at uniform and reasonable prices. Determining conditions under which entry is efficient, and does not undermine the viability of such universal service, is complicated and ultimately rests upon judgement. However, we have argued that efficient component pricing, with equal access pricing of those aspects of postal service which are imbued with natural monopoly characteristics, provides a reasonable starting point for pricing to assure both efficient entry and sustainability of those aspects of the postal service for which monopoly provision is desirable.

3. Concluding Remarks

Our review in section 2 of the nature of the postal service demonstrates that postal service has much in common with other natural monopolies, particularly telecommunications. Like telecommunications the local delivery network is the source of the natural monopoly. In telecommunications, the local loop is a natural monopoly in both call origination and termination,10 but in postal services the natural monopoly of the local network is confined to delivery with collection offering few scale economies. Like telecommunications most of the total “traffic” is local, either within the local delivery network, or between nearby delivery networks. Long distance traffic, as in telecommunications, can be performed by separate companies. However, unlike telecommunications, subscribers are not wired to the network, nor are competitors physically tied to the local delivery network. This makes postal service potentially subject to more competition than telecommunications. The only argument for using the local delivery network is that it is efficient to do so. Unlike local telephone service postal service has no monopoly of delivery to an address.11 Postal

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10 Traditionally this was certainly correct. However, increasing competition, in the form of bypass, has begun to occur. Further down the road competition from another carrier such as a CATV operator may also become important.

11 In the U.S. the Private Express Statutes do give the Postal Service a monopoly in using the mail box at an address. (Others may use the box provided they affixed postage on the item placed in the box reserved for U.S. mail.) In the U.K. Royal Mail has a monopoly on letters with postage less than one pound Sterling.
administrations do face a universal service obligation and this makes cream-skimming by competitors a pervasive concern among postal regulators.

Sustainability of postal service is accordingly a significant issue as we argued in Section 3. The extent of scale and scope economies in postal economics is an important issue for determining not just the extent of protection and regulation required for postal service, but the nature of the services to be offered by postal authorities. It is with this background that our analysis proceeded using the traditional welfare economic framework to evaluate policy, namely the framework of net benefit maximization and its associated Ramsey conditions to take into account a financial viability constraint.

Another important issue for postal service is the cost-benefit tradeoff of service reliability which is addressed in Boronico (1992) and Crew and Kleindorfer (1992a). The results derived are not only consistent with traditional microeconomic theory but also intuitive. Reliability or service quality should be set to equate the marginal costs of increasing reliability with the consumers' marginal willingness to pay for this increased reliability. Of course, understanding these benchmarks in theory is quite different from implementing them in practice, which is further complicated by the existence of regulation.

The issue of regulation of postal service is currently very important in face of the changes that are taking place in postal and delivery services and the ensuing regulatory debate.12 Given the increasing competition in postal services, we might expect that postal services (de-)regulation will be very similar to the traditional public utilities, especially telecommunications. Perhaps the current overriding concern about regulation amongst economists is the deleterious effects it has on internal efficiency. Traditional forms of regulation are of a cost-plus nature and result in an attenuation of incentives for cost minimization. Recent theoretical advances (see Crew and Kleindorfer, 1992a) have examined the information asymmetries that exist between regulators and regulated firms and shows how inefficiencies can be reduced, though not eliminated. The message is that regulatory systems vary in their level of inefficiency. Because of information asymmetries efficiency cannot be achieved

12 In Europe the debate is proceeding albeit slowly but very intensely with the Green Paper, "On the Development of the Single Market for Postal Services," Commission of the European Communities, Brussels.
with regulatory systems. The best that can be done is to choose one that offers minimal inefficiencies subject to equity constraints on process and outcome.

In some respects, however, the situation in the postal sector is more promising, as there do not seem to be the major cross subsidies between long distance and local that exist in telecommunications. In addition, the "baggage" of rate-of-return regulation does not exist. Similarly, the problem of transactions-specific or sunk investment is significantly less but growing as noted in our previous work (Crew and Kleindorfer 1992b). Finally, postal and delivery markets are characterized by strong actual and latent competition, weakening the case for subsidies to entrants which characterized the regulated telecommunications markets some years ago.

Some further research and policy implications stem principally from the above discussion. Pricing, capacity and technology planning and the associated problems of service offerings, reliability and service quality provide one important area of future research. Regulation presents the other opportunity for research. Both have important implications for policy. The key will be to assist postal administrations in their efforts to commercialize their operations, in both quality of service and innovation of new services, and to assist regulators and postal policy makers to ensure continuing incentives for regulation and efficiency through appropriate pricing and entry policies. Understanding these key issues in the context of rapid technological change and competition will present the major challenges for research and policy for postal service in the nineties.

Linking recent advances in the economic theory of postal services to related managerial issues will be key in the above two areas of expanding commercialization of the postal sector and regulatory processes. In particular, the theory outlined here needs to be coupled with available methodologies in marketing, operations, performance measurement, monitoring, accounting, technology and systems planning. New approaches by postal management to the kind of postal service provided would include making the local delivery loop more efficient, and devising means of generating additional traffic for the local delivery network. The projected ABC environment of the USPS and other postal administrations will provide highly automated sorting at the level of final delivery, providing carriers with their mail fully sorted ready for delivery. Such a system might pave the way for new products, such as barcoded mail drop shipped to the destinating sorting office. One thing is clear: postal management will need
to be innovative in devising new products, showing less concern for maintaining all the vertical links in the chain and more concern for the efficiency of the local delivery network. A fundamental focus of postal management in the 90’s must be to provide reliable, customer-oriented services in all accessible links of the postal value chain.

This commercialization of mail service may also raise the question of privatization. Although we have not addressed the subject of privatization in this paper, we do consider it another important issue facing postal administrations and regulators. With the great inroads made by privatization into utilities, it would not be surprising if privatization of postal administrations were to be an issue in the future. In this event, the design of formal regulatory institutions to bolster or replace current commission and ministerial oversight will take on more urgency.

Finally we should not forget that, except for the U.S., postal regulatory institutions are not well developed. This might be viewed as a disadvantage, but it also implies that there exists an opportunity in postal service for innovations in the design of regulatory institutions relatively unencumbered by the rent-seeking apparatus that is a feature of developed regulatory structures. In these circumstances design of regulatory institutions has the potential to provide significant potential benefits to postal services and their customers. It is important that economists and policy-makers respond to the challenge.

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