T-84 10·10·90 9/24/80

CONSUMERS AS COPRODUCERS OF PUBLIC SERVICES: Some Economic and Institutional Considerations

by

Roger B. Parks, Paula C. Baker, Larry L. Kiser, Ronald Oakerson, Elinor Ostrom, Vincent Ostrom, Stephen L. Percy, Martha B. Vandivort, Gordon P. Whitaker, and Rick Wilson

Workshop in Political Theory and Policy Analysis
Indiana University

and

Center for Urban and Regional Studies
University of North Carolina

Prepared for the Policy Studies Journal Symposium, "New Approaches to the Study of Urban Service Distributions."

WORKSHOP
IN
POLITICAL THEORY
AND
POLICY ANALYSIS

Indiana University
814 East Third
Bloomington, IN 47405

CONSUMERS AS COPRODUCERS OF PUBLIC SERVICES: Some Economic and Institutional Considerations

Roger B. Parks, Paula C. Baker, Larry Kiser, Ronald Oakerson, Elinor Ostrom, Vincent Ostrom, Stephen L. Percy, Martha B. Vandivort, Gordon P. Whitaker, and Rick Wilson

Indiana University

and

The University of North Carolina[1]

In recent years, attention to the productive activities of consumers has increased. This attention is most common for service production (Fuchs, 1968; and Garn, et al., 1976). Garn and his colleagues argue that when services are produced,

> the person being served (the client or consumer) is inevitably part of the production process, if there is to be <u>any</u> production whatsoever. Therefore, the resources, motivations, and skills brought to bear by the client or consumer are much more intimately connected with the <u>level</u> of achieved output than in the case of goods production. The output is always a jointly produced output (1976: 14-15).

The role of consumers in producing public services has received particular attention. Partly in response to fiscal pressures and partly due to evidence regarding the inefficacy of their own unaided efforts, some public producers are increasing consumer involvement in service production (e.g., community anticrime efforts such as Neighborhood Watch or solid waste collection agencies' replacement of backyard with curbside trash pickup). In other service areas, consumers are demanding an increased role (e.g., parents and students working with groups like PUSH FOR EXCELLENCE to improve educational services or the Wellness movement among health service consumers). Most analysts of public service delivery, however, have focused on the efforts of organized bureaus and firms, ignoring consumer inputs or assigning them only an insignificant, supplementary role. This focus by analysts is generally shared by public administrators and other actors. However, the productive

role of consumers as coproducers of the services they receive has been a continuing interest for us. (See, for instance, Kiser and Percy, 1980; Ostrom and Ostrom, 1978; Percy, 1978; and Whitaker, 1980.)

COPRODUCTION. Robinson Crusoe (ante Friday) was a consumer producer. Crusoe consumed no more than he, himself, could produce or collect. As societies become more complex, however, a division of labor is common. Most individuals or groups of individuals produce goods or services in order to exchange them for money. Individuals and groups in a society who produce for exchange are, in our terms, regular producers of those goods and services they supply. These same individuals occupy consumer roles with respect to other goods and services. However, individual consumers or groups of consumers, acting outside of their regular production roles, may contribute to the production of some of the goods and services they consume. In such cases they act as consumer producers.[2] In many instances, consumer production is an essential complement to the efforts of regular producers; without the productive activities of consumers nothing of value will result. This appears to be characteristic of much public service production.

Coproduction involves a mixing of the productive efforts of regular and consumer producers. This mixing may occur directly, involving coordinated efforts in the same production process, or indirectly through independent, yet related efforts of regular producers and consumer producers. Coproduction, if it occurs, occurs as a result of technological, economic, and institutional influences. Technology determines whether there are production functions for a service where both regular and consumer producer activities contribute to the output. Economic considerations determine whether it is efficient to mix regular and consumer producer activities to produce the service. Institutional considerations determine whether appropriate mixing is allowed in

situations where coproduction is technically feasible and economically efficient, and whether mixing is discouraged where it is inefficient.

Technical Feasibility. If the quantity of output obtained from a production process is a function of both regular and consumer producer inputs, at least over some range of values of those inputs, then coproduction is technically feasible. All this means is that some change in the quantity of output obtained is expected if there is a change in regular or consumer producer inputs. The marginal products of regular producer inputs and consumer producer inputs are nonzero over some range of input values.[3] Technical feasibility is a weak constraint. Coproduction is technically infeasible only where no amount of regular producer inputs can affect the output obtained or, alternatively, where no amount of consumer producer inputs can affect the output. Technical production relationships among regular and consumer producer inputs with respect to the output obtained are crucial, however, for determining the economic relevance of coproduction.

Two ideal types of relationships can be stipulated where coproduction is technically feasible. In the first, regular producer inputs (RP) and consumer producer inputs (CP) are substitutes. If the production relationship takes the form, $Q = aRP + bCP$, for example, with a and b the respective marginal products of regular and consumer producer inputs, the two types of inputs can be substituted for one another. It is possible to produce output Q_0 using only regular producer inputs (in the amount $RP_0 = Q_0/a$) or only consumer producer inputs ($CP_0 = Q_0/b$). To give a mundane example, municipal trash collectors and citizens may be substituted for each other in transporting refuse to the curbside or to other collection locations. At any point in the production relationship, a one unit reduction in regular producer inputs can be replaced by an a/b unit increase in consumer producer inputs, and vice

versa. When the relationship is one of substitution, it is unnecessary to know how much of one type of input is being used in order to determine the extra output that will be obtained by adding a unit of the other input Thus, decisions about adding or reducing regular producer or consumer producer inputs can be made independently, guided only by their marginal impacts on the level of output.

This independence is not possible with the second ideal type, where the inputs are interdependent. An interdependent relationship might take the form, $Q = cRP^dCP^e$, where c is a scale factor and d and e are the respective output elasticities of each input. With complete interdependence, no output can be obtained without inputs from both regular and consumer producers. The interaction of teacher and student in producing education in the classroom is a ready example of substantial interdependence. The amount of additional output from adding a unit of one of the inputs depends upon how much of the other input is supplied. Thus, decisions about adding (or reducing) regular or consumer producer inputs cannot be guided by independent marginal calculations.

Real world service production relationships probably combine segments where the inputs are substitutes with segments where they are interdependent. Most of the present authors would relax strict interdependence in service production, agreeing that some levels of output can be obtained via consumer production alone, though fewer of us would entertain the possibility of much service production using only regular producer inputs. Students can supply much of their own education in the absence of teacher inputs, but teachers can supply little education without cooperative inputs from students. Police have very little capacity to affect community safety and security without citizen input, yet citizens are able to protect their own homes to a degree in the absence of regular police inputs. Protection from fire loss is more a result of household precautions than of inputs from regular fire service producers.

Economic Relevance. The particular mix of regular and consumer producer inputs that is efficient depends on the extent of interdependence and substitutability in producing a particular service and upon the relative wages and opportunity costs for regular and consumer producers. Production is always subject to constraint. Simplifying service production by stating all regular and consumer producer inputs as hours of labor, we can characterize economic constraints on service coproduction with a budget function. This function has the form, $B = wRP + oCP$, where w is the wage rate for regular producers and o is the opportunity cost applicable to consumer producer inputs. The budget function states all of the combinations of regular and consumer producer inputs obtainable at a given expenditure. The budget function, together with a service production function, determine whether coproduction is economically relevant in a given situation and, if so, the efficient mix of inputs.[4]

Several combinations of budget functions and production relationships are shown in Figure 1. Panel A demonstrates that the optimal choice of inputs with a substitutive production relationship is either all regular producer inputs or all consumer producer inputs. If the production relationship for Q_0 is as shown and the relationship of regular producer wages and consumer producer opportunity costs is that of line B_1, then the least cost combination for producing Q_0 is at point P_1, with RP_1 hours of regular producer input and zero hours of consumer producer input. If, on the other hand, consumer producer opportunity costs are much lower than regular producer wages, represented by budget line B_2, then the optimal (least cost) combination is at point P_2, with no regular producer inputs and CP_2 hours of consumer producer input.

In any specific case coproduction is unwarranted, though in the aggregate the output might be produced optimally using both regular and consumer producer inputs. That is, some consumer producers will feel that their opportunity costs are low and wish to supply the service exclusively with their own input. Other

consumers will feel that their opportunity costs exceed the regular producer wages and will wish to have all of their service supplied by regular producers. Where both arrangements are possible, the aggregate service is likely to result from inputs of both kinds of producers.

Insert Figure 1 About Here

Panel B shows the more likely case for service production, interdependency of regular and consumer producer inputs. Neither regular producers nor consumer producers can supply the service alone; inputs from both are required. Still, the mix of inputs for least cost production depends on the wages and opportunity cost ratio. If it were as in line B_1, where regular producer time was cheap relative to that of consumer producers, the least cost for producing Q_0 would be found at point P_3, with RP_3 hours from regular producers and only CP_3 hours from consumers. With more expensive regular producer inputs and/or cheaper consumer producer inputs, the budget function represented by B_2 might hold, calling for production at point P_4. Regular producer input would be cut to RP_4 while consumer producer input would increase to CP_4 for least cost production. Where interdependency exists, neither very high wages for regular producers nor high opportunity costs among consumer producers will prevent some mixing of their inputs. Indeed, by the nature of interdependency, some minimum quantity of input from each is required before any output can be obtained.

Institutional Considerations. Where coproduction is technically feasible and economically desirable in the production of a service, institutional considerations may still prevent or limit it. Institutional arrangements that negatively affect the likelihood of coproduction include those that bar or limit the use of particular inputs, those that fail to provide sufficient incentives for the employment of particular inputs, or those that mandate the employment of

particular inputs. On the other hand, institutional arrangements may call forth coproductive behavior where it is economically undesirable. Mandated employment of particular inputs or production processes are examples.

INSTITUTIONAL ARRANGEMENTS AND COPRODUCTION. Institutional arrangements are the key to matching coproductive activities to production opportunities where they would be efficient, and to their avoidance in inefficient areas. For some production opportunities, it is possible to rely upon market arrangements to call forth requisite levels of regular and consumer producer activities for efficient production. For other production opportunities, alternative institutional arrangements will be necessary to correctly apportion benefits and costs and thus constrain regular and consumer producer inputs to the correct mixes. An understanding of how institutional arrangements can foster or inhibit coproduction is important for designing efficient service production systems.

Market Arrangements. Where the production relationship of regular and consumer producer inputs is substitutive over some range, pricing mechanisms may be employed to induce an efficient mix of activities or to avoid mixing where it would be inefficient. Solid waste collection is a public service area where market arrangements can work well (Savas, 1979). If there are sufficient competing regular producers, consumers can bargain with them to achieve the particular mix of price and service characteristics they prefer. Characteristics include frequency of pickup, location of pickup (e.g., backyard, curbside, or community dumpster), or whether any discounts for consumer separation of waste items are forthcoming. Some public regulation is required to ensure that service contracts meet sanitation and health standards, but details of service arrangements can be left to bargains between regular producers and consumers.

The key to efficiency in market arrangements is the capacity of consumers to choose the price and service mix they prefer. If constraints are imposed beyond those necessary for health and sanitation purposes -- requiring, for example, that all consumers carry their own trash to curbside -- then inefficiencies will result. Some consumers would be willing to pay the extra cost of backyard pickup. Requiring them to carry their own trash imposes an unnecessary opportunity cost on them. Other consumers might prefer to carry their trash to a community dumpster, or even to a permanent disposal site if they could reduce collection costs. Forcing them to use and pay for curbside collection imposes an unnecessary direct cost upon them. Both types of unnecessary costs represent inefficiencies.

Difficulties with Market Arrangements. Market arrangements may be less successful in organizing the supply of services exhibiting interdependent production relationships. With interdependence, the apportioning of benefits and costs to each producer that is necessary to call forth productive efforts in a market arrangement may be impossible to determine. Regular producers and consumer producers may face incentives to shirk in their productive activities if they anticipate that their shirking will go undetected due to the difficulty of monitoring productivity. Where undetected shirking is a possibility, market exchange may fail as producers of either type cannot be sure that others will conform to their sides of bargains.

Interdependent production relationships may be doubly threatened by shirking where the consumer producer activities are collective in nature. Each individual consumer has an interest in seeing that the correct amount of consumer producer activity is forthcoming, yet has a personal preference that others supply the activity (Olson, 1965). Consumer producers may shirk against one another as well as in their relationship with a regular producer.

Nonmarket Arrangements. Alchian and Demsetz cite the firm as one means of solving interdependence problems (1972). If input suppliers are joined in a firm, with a monitor observing the activities of each contributor to ensure that shirking is minimized, this substitution of hierarchy for market relationships enables the joint contributors to obtain additional output from use of the interdependent production relationship, while protecting each from exploitation by the others. If the team organization is successful, all members receive more than they might through individual, uncoordinated actions.

Are there public analogies to the organizational arrangement of a firm that can link and monitor the efforts of regular producers and consumer producers? Ostrom, Tiebout, and Warren (1961) offered a model of local government as service provider, organizing service financing through collective consumption units and purchasing services from the government's own bureaucracies or from alternative public or private suppliers. Providers can monitor the behavior of the hired regular producers. Providers can monitor consumer producer behavior, too, thus filling the role of monitor in the Alchian and Demsetz sense of linking inputs in an interdependent relationship.

Consider a group of potential consumer producers organizing themselves with respect to the consumption of a particular service. By assumption the service is collective in nature, so some coercive organization is necessary to ensure its financing. The individuals involved constitute themselves as a collective consumption unit, adopt rules governing the financing of service supply, and designate some individual(s) with authority to enforce the rules. The latter collect the necessary funds from members of the collectivity, make an arrangement with a regular producer of the service, and monitor the performance of the regular producer. Where collective consumer producer activities are interdependent with regular producer activities, rules governing their

supply may also be adopted. Providers may then be in a position to monitor consumer producer performance as well as that of regular producers. The providers who supply this monitoring function could be local government officials as in Ostrom, Tiebout, and Warren's model or might be officials of local neighborhood organizations (Rich, 1979). If monitoring by providers works well, efficient mixing of inputs by regular and consumer producers can be expected.

Difficulties with Nonmarket Arrangements. In the firm, the monitor occupies a central position in the productive arrangements. He can replace any of the input contributors whom he deems to be shirking, and at the same time, keep the team in operation. Two elements are essential. One, the authority to replace shirking team members and, two, the ready availability of replacements (Alchian and Demsetz, 1972). Both elements are missing in public service supply. Consumer producers who shirk cannot be easily replaced. Banishment from a community is not a common practice. Fines can be assessed against members of collective consumption units who are found shirking, but the cost of monitoring is high. The authority to replace regular producers and the availability of replacements are problematic. Many local governments are limited by law to self-supply of public services. Where this is not the case, large local bureaucracies may use their political power to prevent replacement. Indeed, civil service and union agreements can make it difficult to replace even one shirking worker in regular production agencies.

A private monitor has ample incentive to monitor vigorously, as his direct reward is derived from surplus generated by interdependent production relationships (Alchian and Demsetz, 1972). This is not the case with most collective arrangements, where surpluses cannot be readily appropriated. Since their compensation is divorced from the efficiency of input mixing, public providers

may find it comfortable to avoid unpleasant or costly monitoring activities. Where inefficient production by regular or consumer producers reduces service output or increases costs, it may be simpler to raise taxes or assessments, or seek a federal grant than to attempt to spur either side to more action. As the cost of monitoring input behavior is probably a positive function of the number of input contributors, we would expect inefficiency to increase with the size of the collective consumption unit. Local neighborhood organization providers may be able to control interdependent production efficiently, while officials of larger city organizations may not.

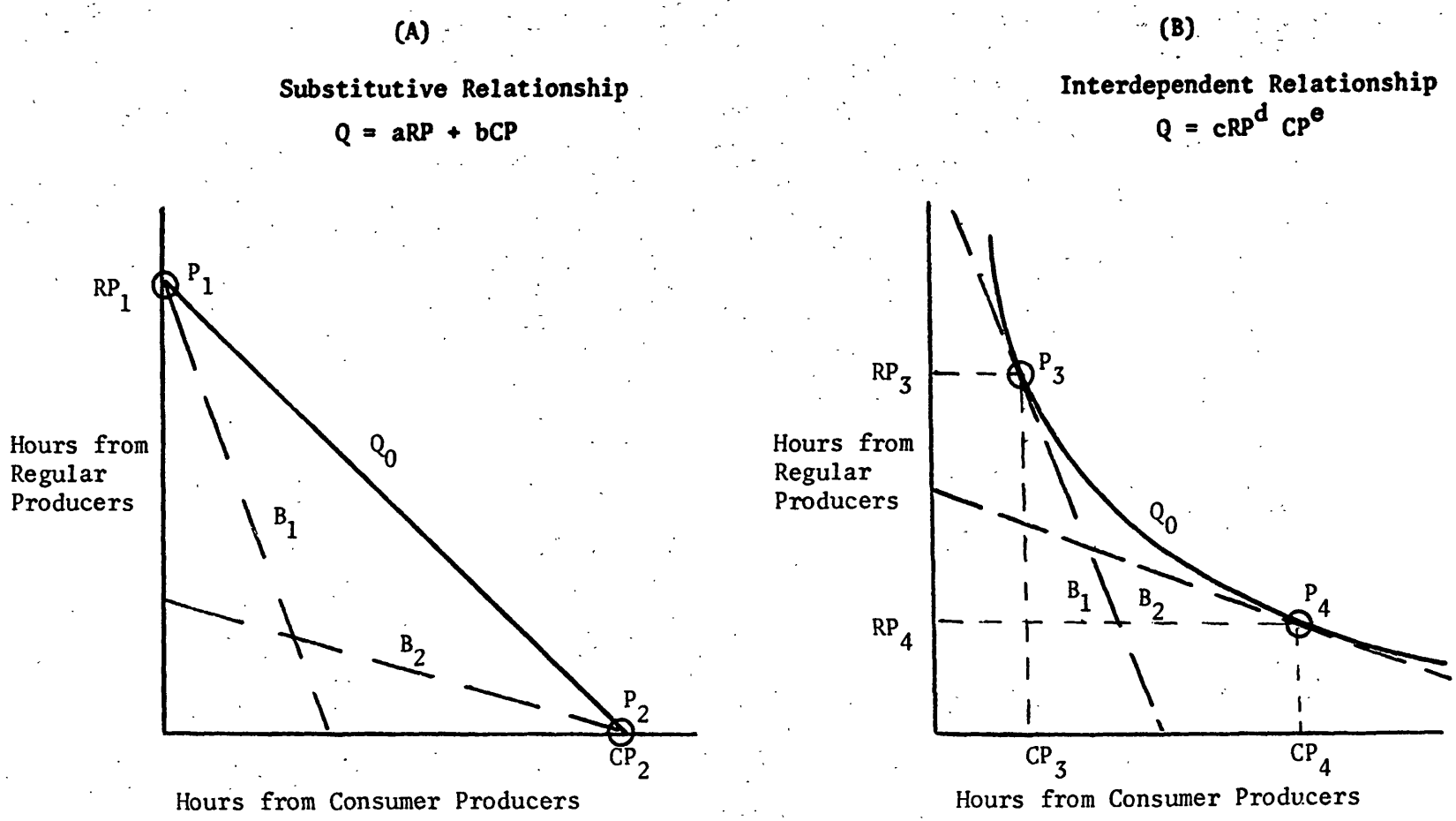
Local government arrangements for service production may often lead to a greater usage of regular producer inputs than is efficient. Organized regular producers may be in a better position to influence service providers than are consumer producers. Bureau heads meet regularly with mayors, city managers, or councilmen. Bureau employees constitute a politically significant minority in many communities. Where their influence is strong, bureau heads and employees can pressure local government providers to overinvest in regular producer inputs, thus increasing bureau budgets. Where monitoring of diverse inputs requires extra efforts to achieve efficient mixes, collective providers may decide to avoid those efforts by relying on regular producers and ignoring consumer inputs.

For all these reasons, collective organization of public service delivery may fall short of the efficiency possible (though not necessarily attained) in interdependent production organized in private firms. The lack of provider incentives to closely monitor input behavior and choose efficient coproductive mixes, together with rigidities that make it difficult to alter the input mix or directly stimulate improved input performance, virtually ensure some inefficiency. But as budget constraints tighten and further investment in regular production is less likely, local government providers may be induced to pay more attention to the possibility of increased consumer production.

The recognition of consumer production opportunities may be accelerated as neighborhood organizations become more involved with service production (Rich, 1979). Local neighborhood coproduction of public services may help to illustrate the efficiency gains that can be made. Neighborhood coproduction is likely to have service distribution implications also. Neighborhoods that are organized to supply and monitor consumer producer inputs in interdependent production situations are likely to obtain considerably better service outcomes. Regular producers may shift their efforts away from neighborhoods that are supplying substantial consumer producer inputs, however. Neighborhoods that supply a substantial amount of their own security through resident patrols or Block Watch groups may find themselves receiving fewer police patrols, for example. If so, the advantages in service outcomes that might be obtained from coproduction may be lost and citizens may become discouraged if their increased efforts are met with decreased efforts by regular producers.

In spite of these difficulties, we anticipate increased attention to and reliance upon coproductive arrangements in public service delivery. Budget constraints, together with a rising consumer awareness of the importance of their own efforts, suggest that a shift in the input mix toward consumer producers may be inevitable. As this occurs, coproduction may come to be recognized as an efficient alternative to increased reliance on regular producers in meeting rising service demands.

Figure 1. Production Relationships and Budget Functions



NOTES

[1]This paper results from regular discussions among the several authors that have extended over the past 2 years. Parks took responsibility for getting these ideas on paper at this time. The remaining authors are listed in alphabetic order for convenience. Our discussions and the preparation of this paper have been supported in part by grants from the National Science Foundation (NSF GI-43949 and NSF SES-79-13397), the National Institute of Mental Health (5T32-MH-15222-02), and the National Institute of Justice (78-NI-AY-0086). The support of these agencies is gratefully acknowledged.

[2]Our use of the term "regular" for those who produce for exchange is not intended to imply that consumer production is not normal. Obviously consumer production antedates regular production for virtually all goods and services. As we argue here, consumer production is essential for most services.

[3]The use of the term nonzero is intentional. Regular and consumer producer inputs may have negative marginal products in some ranges of production relations. Alternatively, one can consider the supply of inputs in the range of negative marginal products as a failure to refrain from inappropriate behavior, or shirking. We are undecided at present as to how such relationships should be conceived.

[4]"Efficient," as used here, refers to technical efficiency, using the minimum amounts of inputs necessary to achieve a given output; and to allocational efficiency, using the minimum cost combination of these inputs.

REFERENCES

ALCHIAN, A. A. and H. DEMSETZ (1972) "Production, Information, Costs, and Economic Organizations," American Economic Review 62 (December): 777-795.

FUCHS, V. R. (1968) The Service Economy. New York: National Bureau of Economic Research.

GARN, H. A., M. J. FLAX, M. SPRINGER, and J. B. TAYLOR (1976) "Models for Indicator Development: A Framework for Policy Analysis." Urban Institute Paper 1206-17. Washington, D.C.: The Urban Institute.

KISER, L. L. and S. L. PERCY (1980) "The Concept of Coproduction and its Prospects for Public Service Delivery." Working Paper No. W80-6. Bloomington, Ind.: Indiana University, Workshop in Political Theory and Policy Analysis.

OLSON, M., Jr. (1965) The Logic of Collective Action. New York: Harvard University Press.

OSTROM, V. and E. OSTROM (1978) "Public goods and public choices," in E. S. SAVAS, ed., Alternatives for Delivering Public Services. Toward Improved Performance. Boulder, Col.: Westview Press, 7-49.

OSTROM, V., C. M. TIEBOUT, and R. WARREN (1961) "The Organization of Governments in Metropolitan Areas," American Political Science Review 55 (December): 831-842.

PERCY, S. L. (1978) "Conceptualizing and Measuring Citizen Coproduction of Safety and Security," Policy Studies Journal 7 (Special Issue): 486-492.

RICH, R. C. (1979) "The Roles of Neighborhood Organizations in Urban Service Delivery," Urban Affairs Papers 1 (Fall): 81-93.

SAVAS, E. S. (1979) "Public vs. Private Refuse Collection: A Critical Review of the Evidence," Journal of Urban Analysis 6: 1-13.

WHITAKER, G. P. (1980) "Coproduction: Citizen Participation in Service Delivery," Public Administration Review 40: 240-246.