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Characteristics of Service, Structure of Networks, and Forms of Inter-Local Cooperation in Local Service Production: Evidence from Florida

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Introduction

The questions relating to ‘what to produce’ and ‘how to produce’ public services in a metropolitan area with multiple jurisdictions have been the central theme of research among the scholars of local government for the past 50 years. While ‘what to produce’ is a ‘provision’ question; ‘how to produce’ is a ‘production’ question. These are two different dimensions in the supply of public services. Efficient provision of services requires matching of residents’ preference with decisions relating to what to produce, how much to produce, and of what standard; matching service cost with financing (fiscal equivalence); regulation of private sector for public provision; and governing rules for citizen choices in organizing governments. This in principle results numerous and often overlapping multiple governments such as counties, municipalities, school districts, or special districts. On the other hand, efficient production of services is associated with, what economists call, ‘technical efficiency’ – the efficient transformation of inputs into outputs or services – forcing local governments to look for organization of production units that are most cost efficient in the production and delivery of public services. The efficient organization of production of a good or service is subject to the economies of scale in production, and internalization of externalities (social costs and benefits) associated with a service. Such economies of scale and externalities differ from service to service. The efficient production units, thus, vary with services in question.

In metropolitan areas, the structure of the production side of a local public economy tends to be different from the provision side (ACIR, 1992). Two streams of literature suggested

two different policy solutions to solve this dilemma. Consolidation literature argued for regional government which will be able to aggregate peoples' preferences, address the issue of fiscal equivalence, and take into account the economies of scale and inter-jurisdictional externalities generated by fragmented smaller governments. For them size and efficiency are positively related. Public choice literature, on the other hand, called for regional governance. To them different public services generate different scale of effects (benefits or costs), fiscal capacity to provide the services is not evenly distributed, citizen preferences for public services are diverse, and these conditions, including technology, vary with place and time. Such diversity and dynamic nature of the conditions demands various governance arrangements to respond to the conditions as they evolve. Local government can organize production through various arrangements including in-house production, intergovernmental and private contracts, coordinated or joint production, franchises, vouchers, and voluntary production (Ostrom and Ostrom, 1977). Each jurisdiction may take independent action, or two or more jurisdiction may agree to take various forms of coordinated action depending on the nature of the problem of public service delivery. The public choice theorists maintain that the diversity among services is such that no organization is the right size to produce all of them efficiently (Bish, 2000), and there is no one best system for all local public economies (Ostrom, 2005)[1].

Since there is no one organization of right size to produce all the public services, we see various production arrangements including in-house production, private contracting, and

[1] The debate between metropolitan-wide government (consolidation) and metropolitan governance is still on. Downs (*New Visions for Metropolitan America,1994)* calls for a metropolitan government to address the complex metropolitan problem. Oakerson, argues for a vision of "civic metropolis"- a governance idea that sees metropolitan areas as complex local public economies, not dominated by any single government unit but governed through the integrating efforts of civil societies, adapting their institutions in response to a succession of problems (Oakerson, 1999, p. 13).

inter-local contracting and joint production in order to capture efficiency. Inefficient production arrangements (choices) may lead to various economic and social costs such as duplication, underinvestment (or underprovision of services) in case of external costs (pollution or congestion) or external benefits (such as health and education benefits to other residents) resulting from the provision of a service, and loss of the economies of scale. ACIR (1992) notes that the decision making process may include cooperation, contracting, collusion, competition, conflict, negotiation and conflict resolution, rulemaking and enforcement, problem solving, and "buck passing". Cities recognize these problems of service production. They outsource almost half of the service they provide; and joint provision of services/or inter-local contracting constitute about one-sixth of total services in cities in 1997 (Warner and Hefetz, 2001). The need for coordinated action in local service delivery, either in the form of service exchange or in the form of joint production arrangements, creates an "institutional collective action" problem where cooperation could potentially improve policy outcome for participating jurisdictions. However, the diversity of services might generate different collective action problems. Since coordinated action requires interaction among jurisdictions, the question is: is there a predictable association between the service and the structure of interactions among jurisdictions in local service production? What determines such forms of interactions? These are the questions of interest of this paper.

Service characteristics, networks, and inter-local cooperation in service production

Tiebout's classic model (1956) captured only competitive dimension of local government behavior in public service delivery. He argued that, in a fragmented setting, local governments will compete among themselves leading to efficient package of service and cost; otherwise, people will recourse to exit with their feet. Ostrom, Tiebout, and Warren (1961) recognized the complexity of local public service delivery: the mismatch between appropriate scale of provision and production units as well as non-matching of jurisdiction with the scale effect of services. They suggested that multiplicity of local governments and governance arrangements are the natural response to address such complexity, and, thus, both patterns of competition and cooperation could be observable in metropolitan areas depending on the nature of the problem in service delivery.

There is rich theoretical and empirical research on individual collective action, particularly in common pool resource-type settings. These research show that individual do come together voluntarily to solve the collective problems they face (Ostrom, 1990). The basic idea of collective action is simple. The collective action occurs if the benefit of collective action is greater than the cost of collective action. The costs of collective action are the cost of communication, negotiation, and coordination; the cost of uncertainty; and the cost of enforcement associated with credibility or trust problems meeting the jointly agreed obligations. The idea of 'institutional collective action' is an extension of the works on 'individual collective action' (Feiock, 2004). Here again the idea is that, like individuals, institutions also work together to solve policy problems that require coordination or joint actions. The social capital was considered the key variable in solving collective action as it would reduce cost of collective action (Coleman, 1988;

Feiock et. al., 2004); and characteristics of actors, their preferences, and iterative interaction between actors (Ostrom, 1990) were considered important determinants of social capital. However, the primary focus of these works was on stressing the need for building social capital for solving collective problem, not on understanding the interaction pattern between or among actors that may have been generated out of the particular nature of the joint problem linked to a particular service.

Contracting literature on public services, too, concentrated on explaining the determinants of single actor's choice on producing in-house or outsourcing (mainly private sector), or on moving from in-house to different production arrangements including private-for-profit, non-for-profit, and public agencies (Nelson, 1997;Jossart-Marcelli and Musso, 2005). Although this literature recognized the importance of service type (not necessarily service characteristics) in municipal choices in service arrangements, it overlooked the coordinated and/or joint action between actors and their interactive behavior on choices of public service provision. Ostrom and her associates' seminal study of the patterns of police service delivery (Ostrom et. al., 1978) demonstrated that the efficient police service production was associated with polycentric police agencies where agencies engage into various production arrangements including cooperation among themselves at local and/or regional level depending on the nature and type of activities (within the police service) having different level of economies of scale benefits. These findings were further supported by studies of delivery of fire services (Ahlbrandt, 1973), and solid waste services (Collins and Downes, 1977). These studies

too focused on the jurisdictions as the primary unit of analysis, not the inter-jurisdictional interaction.

Network literature explicitly focuses on inter-relationship as the unit of analysis of a social phenomenon and helps to understand not only why there is a certain pattern of networks (as an outcome), but also the effect of networks (as an input) on policy outcomes. A number of research on public policy and management network[2] shows increasing evidence of inter-organizational networks, particularly at local level, in diverse areas such as delivery of (mental health) services (Provan and Milward, 1995), adoption of economic development policies and programs (Agranoff and McGuire, …. , 2003), emergence of watershed partnerships (Lubell, et al., 2002), and development of regional partnerships (Feiock et al., 2004). Research has increasingly revealed that 'entities in public economy engage in extensive horizontal as well as vertical interrelationships; and the structure and performance of public economy must be examined at an inter-organizational level of analysis rather than just at the level of a single unit' (Ostrom, 2005). These studies mainly used networks as explanatory variables.

Determinants of inter-jurisdictional networks in service delivery

Although as of now there is no direct empirical research aiming to explore the association between the service characteristics and the patterns of inter-organizational relations,

[2] Berry et al., (2004) distinguishes three stream of network literature: a) sociological networks, b) policy networks, and c) public management networks.

service delivery studies do indicate that different dimensions of services have bearing on the types of provision arrangements. There is no unanimity among scholars as to how one should classify the dimensions of the services in empirical investigations. However, literature seems to focus on two broad dimensions: a) types (categories) of services, and b) characteristics of services. Majority of studies dealing with alternative service delivery followed types or category of services (such as police, sewage, water, library, etc) along with characteristics of actors and institutions as explanatory variables for various production arrangements (Jossart-marcelli and Musso, 2005). Post (2000) approached the issue from the capital-intensive versus labor-intensive services (nature of the services) and showed that the likelihood of intergovernmental agreements is higher with former than the later. Savas (2000), although did not provide empirical evidence, suggested the importance of both dimensions in the choice of production arrangements. However, his classification of service is based on the excludability and jointness of consumption properties of goods and services and argued that specific production arrangement would depend on the attributes of the goods and services[3]. Bish (2000), in his service delivery study in British Columbia, further demonstrated the importance of both dimensions. Further, he argued that the analyst needs to analyze the provision arrangements at the "activity level"[4] (not the functional level) with proper consideration of the characteristics

[3] Ten such production arrangements suggested by Savas (2000, pp. 88-89) are government service, government vending, inter-governmental agreements, contracts, franchises, grants, vouchers, free market, voluntary service, and self-service. The attributes of the services mentioned are specificity of service, availability of producers, efficiency and effectiveness, scale of service, relating benefits and costs, responsive to consumers, susceptibility to fraud, economic equity, racial equity, responsiveness to government direction, and size of the government. However, all these attributes are not related to the good or service; some are related to characteristics of actors such as size of the government, and issues surrounding provision decisions such as efficiency, effectiveness, and equity (Savas, 2000, pp. 92-101).

[4] A service, for example police, is made up of many composite activities such as police patrol, emergency dispatch, crime investigation, training, crime lab, etc. ACIR (1992, p. 69) uses the term 'service components' for what Bish's used for activities (Bish, 2000).

of the activity such as ‘production of a large capital facility’ (such as a land fill, a transit system) and ‘requirement for specialized equipment or personnel’ (e.g., legal expertise, computer maintenance) creating economies of scale in local government activities (Bish, 2000, p. 79). The scale effect from the former characteristics is realized where serving a bigger population lowers cost per person. On the other hand, the scale benefit from specialized equipment or personnel results when ‘governments serving small populations do not need the service often enough to provide it efficiently in-house, but that provide specialized services to other governments or organizations’ (Bish, 2000, p. 79). These two characteristics are associated with Williamson’s characterization of ‘physical asset specificity’ and ‘human-asset specificity’ (Williamson, 1981) that are extensively used in explaining ‘make or buy’ decisions, or monitoring of contracts by municipalities (Nelson, 1997; Brown and Potoski, 2003).

Asset specificity and metering difficulty are transaction related characteristics. A public good or service is asset specific if it requires transaction related investments either in physical asset, or in specialized skills, or in specific process. Once such investment is made, they will have only limited or imperfect alternative uses for substantial period of time (Nelson, 1997). A public good or service with high asset specificity, hence, means large investment in physical assets or in specialized skills or equipment. Metering difficulty, on the other hand, is the degree of difficulty in metering or monitoring of quantity and/or quality of output or benefits of a service (Brown and Potoski, 2003). The outputs of some services or activities (components of a service) are more difficult to measure than others. For example, the outputs or benefits from sewer, water, or refuse

collection are easier to measure than the outputs of services such as fire, police, and emergency services. In the former case, the outputs are divisible, exclusion is possible, and costs can be allocated based on the benefits received. On the other hand, in the later case, outputs are not divisible, exclusion is difficult or not possible and there is no objective distribution of costs and benefits between partners and link between such costs and benefits.

Bish (2000) pointed out that large/specialized investment in physical assets or skills or equipments is associated with the economies of scale benefits in relation to the population served; and, therefore, serves as a motivation for communities for coordinated or joint action. He, however, did not explain the real or perceived costs and uncertainties associated with asset specificity, either in the form of physical assets or skills or equipments. Such costs tend to vary with the size and socio-economic characteristics of the communities. Smaller communities, for example, generally lack 'critical resources' such as fund, skills or equipment for the production of services; thus, for the smaller communities the production of services by themselves is constrained by the lack or inadequacy of 'critical resources' or by the lack of economies of scale if fund is not a problem. These problems will be larger in case of fiscal stress and increasing population demanding for increased services. The costs for these communities are generally 'information search costs' (as to who has the adequate critical resource), and 'investment lock-up costs'[5] limiting alternative uses of resources for other service needs. Other costs

[5] Investment lock-up costs are perceived opportunity cost of the alternative uses of the investments intended for a particular service. These costs arise because of the lock-up of investment in a particular service (such as drainage or crime lab) for a long time; and these costs will be higher for communities that have high value for money (that is, those are fiscally stressed) and high time preference for other services.

are related to uncertainties or trust, in case of cooperative production arrangements with jurisdictions having adequate critical resources. These costs are any *back-up costs* in case of interruption of services from supplier governments or *any higher or discriminatory price on service delivery* due to the monopolistic environment of the supplier entities in cooperative production arrangements. Together these costs could be termed as 'critical resource costs'. For larger communities along with fiscal capacity to produce services, the nature of costs and uncertainties associated with asset specificity are different. They face externalities such as congestion to its residents in the form of overcrowding on its roads or parks and environmental benefits to other residents because of pollution control or watershed programs. Because of high cost of exclusion, it creates free-rider problem. They might also have *surplus capacity,* at least in the short-run, due to large investment requirement in physical assets[6]. Besides, they might perceive risk of 'investment hold-up' arising out of the likely opportunistic behavior on the part of service receiving jurisdictions threatening the producing (or supplier) jurisdiction either to terminate the service agreement or renegotiate the terms after the investment is made for the increased level of service production. However, this risk is very low in case of very limited number of jurisdictions available with adequate critical resources to credibly produce the services to meet the needs of the partner jurisdictions. When dealing in private market, according to Williamson (1981), such costs would lead to vertical integration of firms in order to minimize the transaction costs in the private market. In the case of public market of local service delivery, jurisdictions tend to look for cooperative actions between or among

[6] Generally when large investments are made, it is not only the present need but also the future need of at least medium term is taken into account in the provision of services with high asset specificity requiring large investments. This means that these investments will have surplus capacity at least in the short run to benefit from the economies of scale.

themselves to minimize such costs leading to efficient production of public services. Analogous to Williamson's vertical integration, this is a *scale integration* of service production where jurisdictions wish to enhance efficiency while maintaining their autonomy.

Metering difficulty is another important characteristic of services that has implications on production arrangements (Williamson, 1981). High metering difficulty generates the problems of free-riding and opportunistic behavior. These problems increase the transaction costs of cooperative action. Such costs are primarily negotiation costs relating to the distribution of benefits and costs, and monitoring and enforcement costs to curb free-riding or opportunism of actors. These costs very with the service (or its components) as 'metering difficulty' is different for different service or its components. In general, thus, cooperation is much easier to achieve for goods and services that are divisible and easily measured (Steinacker, 2004) as opposed to services whose outputs are not tangible or whose production is complex posing difficulty to write even a contract (Ferris and Graddy, 1986).

Hypotheses

As discussed above, different service or its component activities have different degree of asset specificity and metering difficulty. These characteristics result different collective action problems in service production which, in turn, lead to different patterns of

coordinated actions by jurisdictions in an attempt to solve those problems. Hence, one should expect a systematic association between the service characteristics and the patterns of inter-local cooperation in local service delivery.

Scholz, Feiock, and Ahn (2005) suggest that 'resource networks' and 'contract networks'[7] are two layers of networked relationships in joint provision of services. Further, these two networks are related to information search problem and credibility problem leading to 'weak-ties' networks (Granovetter, 1973) and 'strong-ties' (or 'clustered' or 'dense') networks respectively. The underlying logic is that different collective activity (or public service) generates different collective action problems that actors try to solve. In this process, they contact actors where they attempt to minimize information search cost; and once the relationship is formal (contract), they seek to minimize credibility problems related to the fulfillment of agreed obligations. What is missing (or overlooked) in between the service type and the consequent collective action problems associated with the service is the transactional characteristics of the service that generate these problems. The specific structure of inter-jurisdictional networks is, then, the response to solve such problems.

Since distribution of 'critical resources' (funds, skills, or equipments) is uneven between jurisdictions; the smaller the jurisdiction, the more limiting the ability to produce the services (or its activities) that have high asset specificity such as sewer or water supply.

[7] 'Resource (or contact) networks' emerge when actors (individuals or organizations) engage in contact with others and share critical information. 'Contract networks', on the other hand, result when actors enter into service agreements in which commitments of cooperating parties are identified (Scholz, Feiock, and Ahn, 2005).

They tend to look for cooperative production arrangements of such services with jurisdictions possessing adequate ‘critical resources’ in order to minimize their ‘critical resource costs’. This also gives reasonable assurance to smaller jurisdictions that the other party (the large jurisdiction) has enough capacity to produce and deliver services without interruption, for example. Larger jurisdictions also gain form such cooperation. In addition to scale benefits, they can minimize costs resulting from externalities and excess capacity, if any. These conditions provide sufficient incentives for both smaller and larger jurisdictions to cooperate that outweigh the risks associated with such relationships. When asset specificity of a service is low, it is plausible that the incentive for jurisdictions to cooperate is low as there is little or no economies of scale or externalities associated with the transaction of the service depending on how low the asset specificity is. In such circumstances, if there is a cooperative effort, one would expect cooperation between similar size jurisdictions. This may also mean that there could be more jurisdictions with ability to produce specialized services providing a condition to forge relationships for mutual benefits. This leads to following hypothesis with respect to asset specificity and network relationships:

Hypothesis 1: The higher the asset specificity of a service (or its component activities), the stronger concentration of the network ties between the smaller and a few large jurisdiction possessing adequate critical resource.

Hypothesis 2: The lower the asset specificity of a service, the weaker the concentration of the network ties between the smaller and a few large jurisdictions.

The relationship between metering difficulty of a service and the consequent network relationships among jurisdictions is much more straightforward. When metering difficulty is high, exclusion becomes very costly leading to opportunism and free-rider problems. The jurisdictions, hence, would want to have close ties (or cross ties) among each other to ensure compliance (or to minimize non-compliance) through watching each other. One would then expect to observe more joint cooperative production arrangements[8]. On the other hand, when metering difficulty of a service is low, the costs and benefits of the service can be easily measured making the exclusion possible for non-payers of the benefits of the service. Here, one would observe more bilateral – a sort of service exchange – production arrangements between cooperating jurisdictions. Hence, following hypotheses regarding metering difficulty and network structure:

Hypothesis 3: The higher the metering difficulty, denser the ties among jurisdictions depicting joint production arrangements.

Hypothesis 4: The lower the metering difficulty, the less dense the ties among jurisdiction exhibiting a tendency towards more bilateral cooperative arrangements.

Besides these two separate dimensions of service characteristics, four combinations of these dimensions are also possible: a) high asset specificity with high metering difficulty, b) high asset specificity with low metering difficulty, c) low asset specificity with high

[8] When looking at inter-jurisdictional relations for a set of diverse services, there could be the presence of 'multiplex networks', that is, jurisdictions are inter-connected (or bonded) with each others through multiple cross service agreements that allow them watch for any opportunistic behavior.

metering difficulty, and d) low asset specificity with low metering difficulty. Following the single dimension logic of each characteristics, high asset specificity with high metering difficulty would project network relationships between smaller and a few large jurisdictions of denser ties. In case of high asset specificity with low metering difficulty, the relationship would tend to be still between smaller and a few large jurisdictions but of more bilateral form. On the other hand, service with low asset specificity and high metering difficulty would expect weaker concentration of ties between smaller and a few large jurisdictions but it would be denser. When asset specificity is low with low metering difficulty, the weaker concentration of ties between the smaller and large jurisdictions would tend to be less dense. Thus, the asset specificity tends to relate to whom to cooperate with (such as between smaller and a few large jurisdiction), whereas the metering difficulty is more associated with the form of relationships such as joint or bilateral. These four dimensions are shown in Annex 1.

Research design

In order to investigate the above questions, this paper follows a quantitative case study research design. The case study area is the Pinellas County in the state of Florida. The unit of analysis is inter-jurisdictional relation which is operationalized by 'inter-local service agreements'. Formal inter-local agreements take various forms including Memorandum of Understanding (MOU), Intergovernmental Agreements, Mutual Aid Agreements, and Joint Planning Agreements (LCIR, 2001b). Inter-local cooperation is

defined broadly to include formal cooperative production arrangements between two or more jurisdictions[9]. As the primary focus of this study is to determine the link between service characteristics and the structure of inter-jurisdictional relations associated with a particular service, the inter-jurisdictional relation is measured by network structures of the relations. It employs Network Analysis and uses UCINET to draw network diagrams and to calculate network measures. For analytical simplification, this paper uses only dyadic and undirected formal relationships between general-purpose local governments. Undirected relationship is simply the presence or absence of a relation; in this case, it is just the presence or absence of inter-local service agreements (ILAs). Hence, the value (for example, the number or frequency of agreements between jurisdictions) or the direction of the relation is not taken into account.

The network size comprise of 25 actors comprising of only county and cities in county area. The presence of relationship is measured by ties. Two primary network measures were calculated to examine the hypotheses. The concentration of ties between jurisdictions is captured by network centrality, whereas the ties among jurisdictions are measured by network density. Centrality, in simple terms, is a measure of a 'central point' with a great many connections with other points. A point could be locally central or globally central in a graph. Degree centrality measures how well connected a point is within its local environment. Centralization, on the other hand, is related to the overall structure of the network graph; and it measures how tightly the graph is organized around

[9] Inter-local cooperation is utilized through both informal and formal agreements. While there is no documentation of the extent of the presence of informal inter-local agreements, LCIR (2001b) views that large number of 'paperless' inter-local agreements still exits involving everything from 'handshake' commitments to provide emergency services to mutual understanding that one county will house another's jailed inmates 'upon verbal request'.

its most central point. Density is a measure of general level of linkages among the points in a graph. The more points connected to each other, the more dense will the graph be. This measure can vary from 0 to 1; the density of a complete graph being 1 (Scott, 1991)[10]. The points in this analysis are the individual jurisdictions – the cities and the county in the Pinellas County.

The analysis uses eight diverse services. They are fire, police, sanitary sewer, parks/recreation, potable water, solid waste, traffic signal, and street/road construction and maintenance[11]. The inter-local service agreements data is based on the Inter-Local Service Delivery Profile put together by the Pinellas County and submitted to the Department of Community Affairs (DCA) as a part of Florida Statutes requirement[12]. It covers mainly on-going agreements until January 2004. The measures for the asset specificity and metering difficulty come from the scales developed by Brown and Potoski (2003). These are average scales that range from 1 to 5; higher the points in scale, the higher the asset specificity and metering difficulty. Other socio-economic information comes from different reports and online websites of the concerned jurisdictions.

Inter-local cooperation in service production in the Pinellas County

[10] The concept and definition of measures are taken from Scott, 1991.
[11] The choice of the number and types of services was limited by the data availability. The inter-local service delivery profile included only education, potable water, sanitary sewer, solid waste, drainage, public safety, parks and recreation, and transportation. Education was excluded because it is mainly provisioned by School districts. Drainage was not included because of lack of asset specificity and metering difficulty measures to compare with the network measures.
[12] The purpose of this one time effort was to review service delivery coordination among jurisdictions within the County and to lay out plans to overcome coordination problems, if any. Florida Statues required service coordination review only in selected key service areas.

Governance and service coordination structure

The Pinellas County is one of the 67 Counties in the State of Florida. Formed in May 1911[13], it is a well-built and highly fragmented urban county in the Tampa-St. Petersburg Metropolitan Statistical Area (MSA). It has 24 cities and 36 special districts. Out of total population of 942, 412[14], cities cover about 70 percent of the population. The Pinellas County area is very compact; jurisdictions in this area live in each other's backyard[15].

In the State of Florida, Florida Statues provide broad legal framework for counties and cities to assume service provider role. Cities provide services in their incorporated areas, whereas counties provide services in the unincorporated areas. With the Florida constitutional amendment of County Home Rule in 1968, the counties become to be recognized as providers of urban-type services[16]. Over the years, local governments found inter-governmental (inter-local) coordination in service delivery as an effective means to deal with inter-jurisdictional externalities and the economies of scale for the efficient provision of local services to their residents.

Although Florida's statues are abound with the references to varying levels of intergovernmental coordination ranging from informal to formal as well as general pronouncements of legislative intent recognizing intergovernmental coordination as a valuable tool and goal for efficient government, Florida's premier statues of

[13] Legislative Committee on Intergovernmental Relations (LCIR), 2001a.
[14] 2004 estimates by University of Florida.
[15] Observation made by the Pinellas County Planning Department Official during my visit there on August 9, 2005.
[16] Pinellas County got Home Rule status in 1890 (LCIR, 2001a)

intergovernmental coordination at local level is Inter-local Cooperation Act of 1969 (LCIR, 2001b, p. 23). This act authorized local government units to enter into inter-local agreements with public or private entities for the purpose of improving the efficiency and/or effectiveness of local governments (LCIR, 2001b)[17]. There is no specific incentive or disincentive built-in the State statutory provisions. These statutory provisions are primarily intended to facilitate voluntary cooperation between or among local jurisdictions. Thus, no overarching state policy exists to reward governmental entities who coordinate well and/or penalize those who do not (LCIR, 2001b, p. 27). So far the limited investigation on inter-local coordination in service delivery in Florida, mainly led by LCIR, primarily focused on intergovernmental coordination practices and challenges, and status and issues of functional transfer[18]. They did not look into structural patterns of inter-jurisdictional relationships arising out of the service specific characteristics.

Network analysis and discussions

There are altogether 258 inter-local agreements (ILAs) in eight service areas in the Pinellas County area. While the overall mean ILAs is just over 10, the distribution of ILAs varied with service area. The solid waste service has less than half mean ILA (0.36) whereas street service has more than two mean ILAs. Similarly, the mean ties also varied

[17] Other acts facilitating inter-local agreements are Local Government Comprehensive Planning and Land Development Regulation Act (Growth Management Act), Government Efficiency and Accountability Reform (adopted in law by the Legislature in 1999), and Government Conflict Resolution Act (LCIR, 2001, pp. 23-25).

[18] Two such studies are Intergovernmental Coordination in Florida (LCIR, 2001) and Local Government Function and Formation in the Service Delivery Arena: Review of Relevant Research and Law (Florida Advisory Council on Intergovernmental Relations, 1995). Broadly functional transfers are of two types: permanent functional transfers and temporary functional transfers. Permanent transfer occurs when functions permanently move to other entities such as special district, annexation, etc; whereas temporary transfers occur through inter-local service agreements.

significantly. While the crime prevention service has highest mean ties (8.28), parks/recreation has only about one mean tie. The distribution of ties by service is shown in Table 1 below.

Table 1: Distribution of ILAs and Ties by service

Service	No of ILAs	No of ties - LG only	Mean ILA	Mean Ties
Fire prevention	37	134	1.48	5.36
Crime prevention	24	207	0.96	8.28
Sanitary sewer	45	54	1.8	2.16
Parks/recreation	29	18	1.16	0.72
Potable water	24	42	0.96	1.68
Solid waste	9	48	0.36	1.92
Traffic signal	32	36	1.28	1.44
Street/road	58	30	2.32	1.2
	258	569	10.32	22.76

The jurisdiction-wise distribution of ties is given in *Annex 2*. The distribution of ties by jurisdictions shows that the Pinellas County has the highest number of ties among all the existing ties. Other cities having most ties are the city of St. Petersburg, Pinellas Park, Clearwater and Largo. These ties also very by cities and by service. This is also reflected in the network graphs of the services included in the analysis. These graphs are presented in *Annex 3*.

Table 2 below gives the calculated values of network centralization and network density along with the asset specificity and metering difficulty scales.

Table 2: Service characteristics and network measures by service				
Service	Asset specificity	Network centralization	Metering difficulty	Network density
Fire prevention	3.80	61.78%	3.24	0.220
Crime prevention	3.37	66.85%	3.60	0.340
Sanitary sewer	4.09	62.68%	2.36	0.090
Parks/recreation	2.94	37.50%	2.61	0.030
Potable water	3.94	64.86%	2.44	0.070
Solid waste	3.33	100.00%	2.12	0.080
Traffic signal	2.91	75.00%	2.24	0.060
Street/road	2.64	61.23%	2.40	0.048
Correlation		*0.083*		*0.909*

The above table shows the association between the asset specificity and network centralization, and between metering difficulty and network density. Although the network centralization varies with the asset specificity of the service, the positive association between the asset specificity and network centralization (Hypotheses 1 and 2) is not strong. The correlation shows that in general higher asset specificity is associated with higher network centralization, but the coefficient is very small indicating a very weak relationship. Other factors might be playing important role in affecting the structure of relationships. For example, in the case of the solid waste service, the legal requirement that the county takes countywide responsibility for the final disposal of the solid waste makes the county very central in the network relationship since all the cities in the county must dispose the waste at county managed disposal site. So, even if the asset specificity of solid waste is not that high in comparison to other services, the network centralization turned out to be the highest.

The relationship between the metering difficulty of a service and the structure of network is much clear and in line with the theoretical expectations (hypothesis 3 and 4). When

metering difficulty is a problem, jurisdictions tend to enter into a pattern of relationship where often many jurisdictions are involved to watch each other to minimize the free-riding or opportunistic behavior. Hence, as expected, we see a denser network in the case of higher metering difficulty of the service. For example, as the metering difficulty gets higher from 2.44 (water) to 3.60 (crime prevention), the network density – percentage of all ties in the network – also becomes greater from 7.0 % to 34.0 %. The correlation between the metering difficulty and the network density also shows high positive correlation coefficient (0.9) between the two.

For other combinations of the asset specificity and metering difficulty, as outlined above, the pattern of network structure is less clear. What is emerging, though, from the analysis of this small set of diverse services is that for services that have high asset specificity and high metering difficulty, the pattern of relationship is more concentrated and dense. That is, there is a tendency for a relationship between smaller and a few large jurisdictions, but they would be tied to among other to minimize the problem arising out of metering difficulty. The fire and crime prevention services depict this tendency (above table). For other services (for example, sewer, solid waste, roads, etc) which have relatively high asset specificity but low metering difficulty, one could still observe concentrated relationships but with more towards one to one (bilateral) type.

Conclusion

This paper set out with the objective of investigating the association between service characteristics and the structure of networked relationships between general purpose local jurisdictions in local public service delivery. It hypothesized that higher asset specificity would lead to greater degree centrality in network relationships; whereas when the metering difficulty is greater, the network relationship would tend to be more dense. It followed social network analysis to examine the hypotheses using inter-local agreement data from the Pinellas County in Florida.

In general, the findings are mixed. Although the empirical examination shows a positive association between the asset specificity and the network centralization, the relationship between the two is very weak across the diverse services. On the other hand, the relationship between the metering difficulty and the network structure is consistent with the expectation. They have positive and substantial relationship indicating that when service metering is a major problem, they would like to have more of dense relationships to minimize free-riding or opportunistic behavior.

This study has two major limitations. First, this is a case study of one county and eight services out of many services provided by local jurisdictions to their residents. So, the findings may not be easily generalized. Second, the information on inter-local service agreements is not comprehensive. However, the information is believed to be reasonably enough to analyze, at least, the pattern of inter-jurisdictional relations in local service

delivery[19]. Hence, conclusions drawn from the analysis should be seen in the light of this limitation. Nevertheless, the findings provided empirical basis to answer some of the complex questions of why inter-local service networks form as they do. Future research should attempt to concentrate investing these questions in large and diversified geographic areas employing multiple services (or their component activities) in order to overcome some of these limitations. It should also examine these questions over a longer time span to see how these networks evolve over time and whether the empirical relationship between the characteristics of service and structure of networks still holds true.

[19] Ms. Elizabeth Freeman, Pinellas County Planning Department, informed me that, though the existing information is not comprehensive and does not include all the services and agreements, it reveals the general pattern as to how service delivery business is done in the Pinellas County.

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Annexes

Annex 1: Combined dimensions of asset specificity and metering difficulty and its affect on the cooperative arrangements in service production

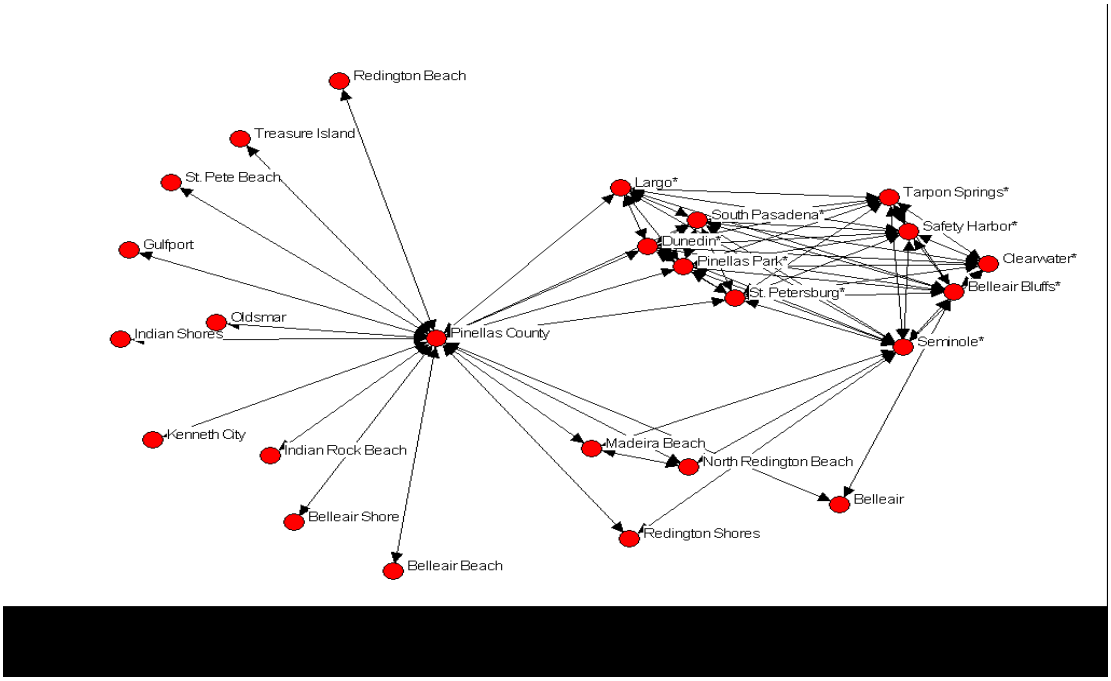
Metering difficulty	**Asset specificity**	
	High	**Low**
High	Small – large jurisdictions More joint production	Similar jurisdictions? More joint productions
Low	Small – large jurisdictions More bilateral arrangements	Similar jurisdictions? More bilateral

Annex 2: The distribution of ties among jurisdictions by service in the Pinellas County

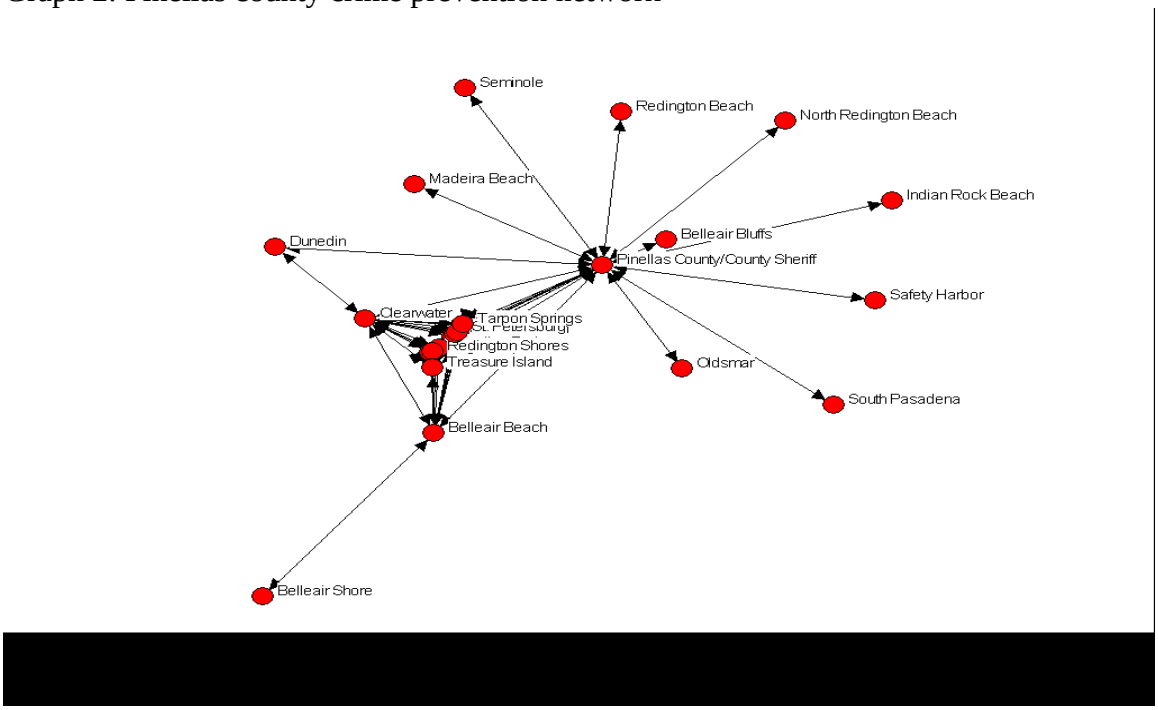
Jurisdictions	fire	crime	sewer	parks	water	solid waste	traffic	street/road	Total
Belleair	2	13	1	0	1	1	0	1	19
Belleair Beach	1	14	1	0	0	1	1	1	19
Belleair Bluffs*	10	1	0	1	0	1	1	1	15
Belleair Shore	1	1	1	0	1	1	0	0	5
Clearwater*	8	14	5	1	1	1	0	1	31
Dunedin*	10	2	2	1	1	1	1	1	19
Gulfport	1	13	1	0	1	1	1	1	19
Indian Rock Beach	1	1	1	0	0	1	1	1	6
Indian Shores	1	13	1	1	0	1	1	0	18
Kenneth City	1	13	0	0	1	1	1	1	18
Largo*	8	13	4	0	1	1	1	1	29
Madeira Beach	3	1	1	1	1	1	1	0	9
North Redington Beach	3	1	1	0	1	1	0	0	7
Oldsmar	1	1	1	1	2	1	1	0	8
Pinellas Park*	10	13	3	0	3	1	1	1	32
Redington Beach	1	1	0	0	0	1	1	0	4
Redington Shores	2	14	1	1	0	1	0	0	19
Safety Harbor*	9	1	2	0	1	1	1	1	16
St. Pete Beach	1	13	1	1	2	1	1	0	20
St. Petersburg*	9	13	8	0	4	1	0	1	36
Seminole*	12	1	0	0	1	1	1	1	17
South Pasadena*	10	1	1	1	3	1	1	0	18
Tarpon Springs*	9	13	1	0	1	1	1	1	27
Treasure Island	1	13	1	0	0	1	1	1	18
Pinellas County	19	23	16	9	16	24	18	15	140
Column sum	134	207	54	18	42	48	36	30	569

Annex 3: Network graphs

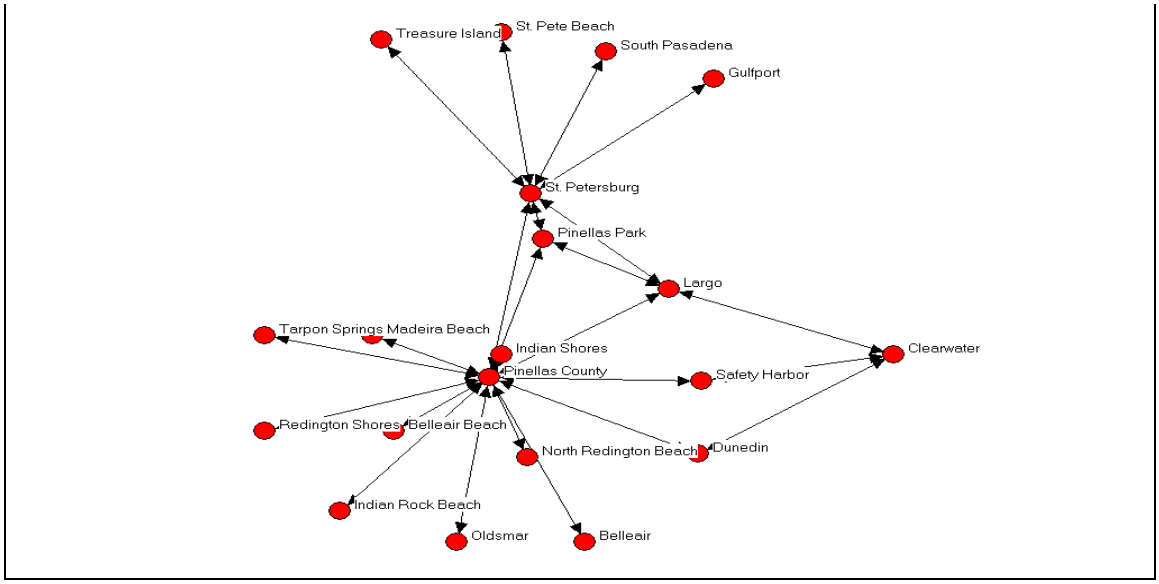
Graph 1: Pinellas county fire prevention network



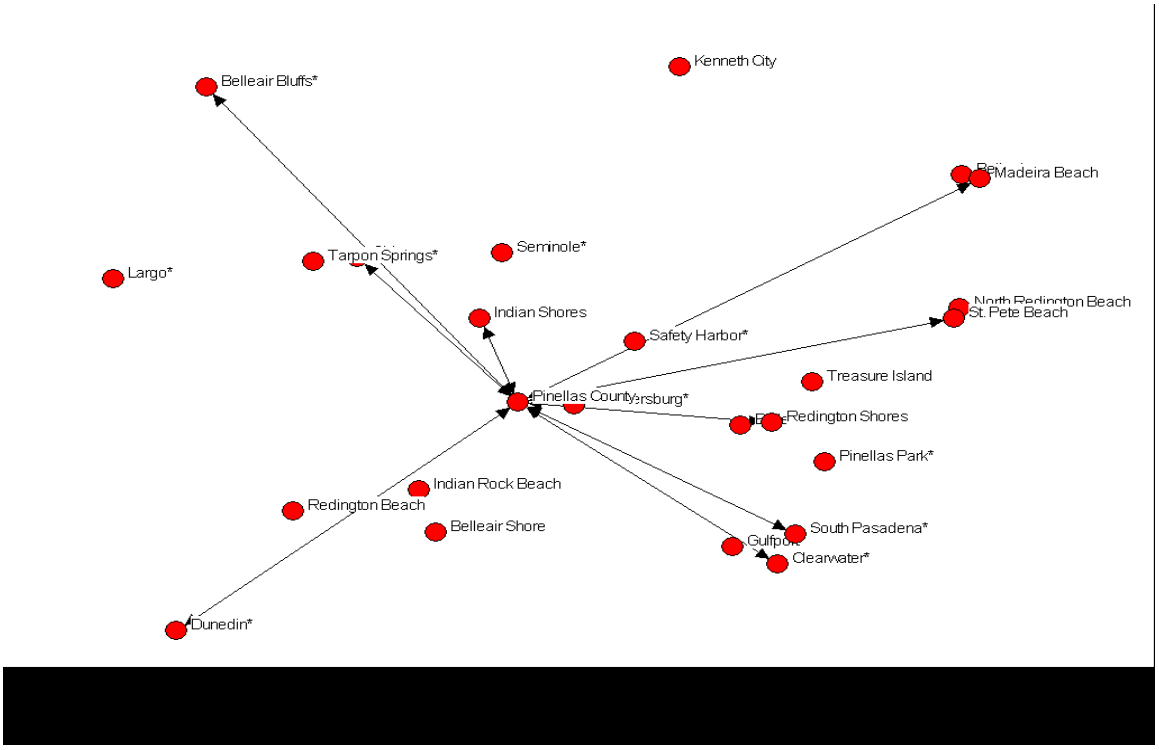
Graph 2: Pinellas county crime prevention network



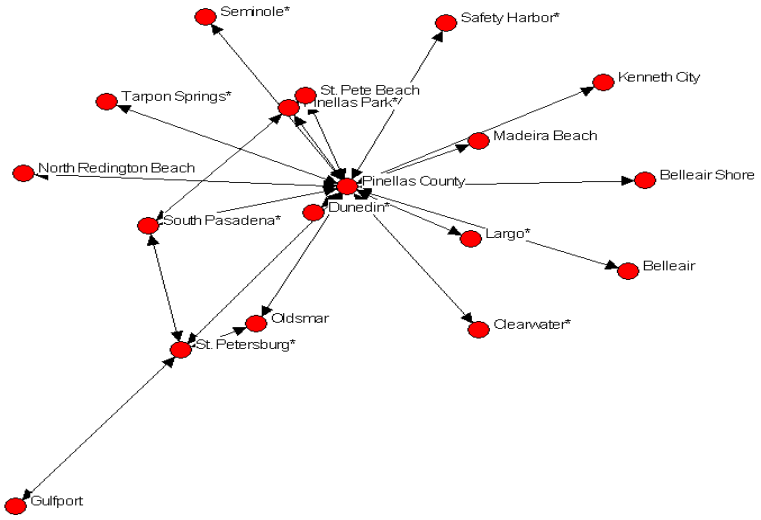
Graph 3: Pinellas county sanitary sewer network



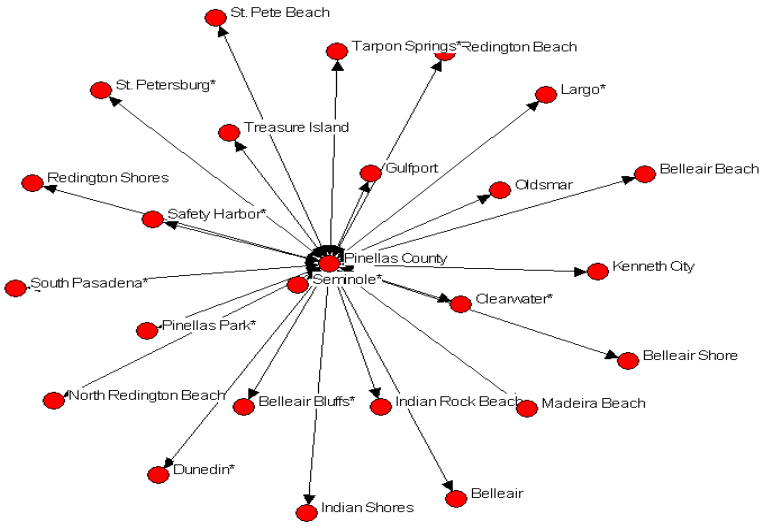
Graph 4: Pinellas county parks/recreation network diagram



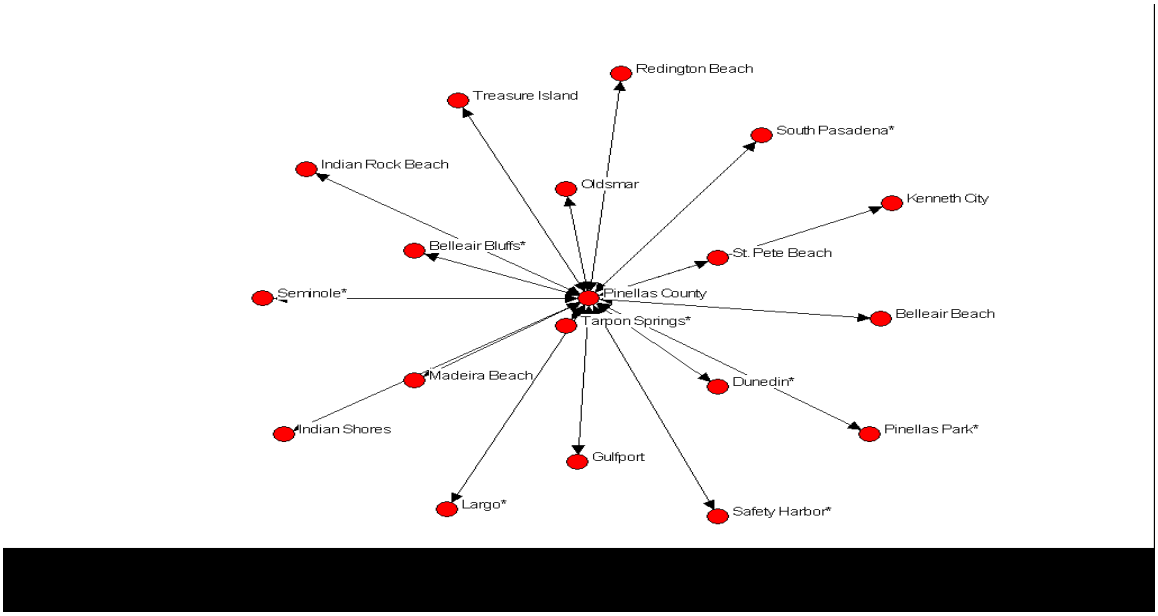
Graph 5: Pinellas county potable water networks



Graph 6: Pinellas county solid waste networks



Graph 7: Pinellas county traffic signal network



Graph 8: Pinellas county street/road network