INTERORGANIZATIONAL AND INTERDEPARTMENTAL RESOURCE DEPENDENCY OF E-GOVERNMENT APPLICATIONS

Cenk SOZEN
Baskent University
Başkent Üniversitesi, Sağlık Bilimleri Fakültesi
Bağlıca Kampüsü Eskişehir Yolu 20. km
Bağlıca 06810 ANKARA
E-mail: csozen@baskent.edu.tr

H. Okan YELOGLU
Baskent University
Başkent Üniversitesi, Fen Edebiyat Fakültesi
Bağlıca Kampüsü Eskişehir Yolu 20. km
Bağlıca 06810 ANKARA
E-mail: okany@baskent.edu.tr

Abstract

The research on the relationship between environment and organizations has been an important issue in the management and organization theory literature. One of the important theories which brought new insights to the environment-organization interaction is resource dependency theory (Pffefer and Salancik, 1978). Organizations have to access resources from their environment to provide required input for their internal operations. Thus, organizational design for internal efficiency seems meaningless without reaching resources. The effectiveness of an organization is more related with the management of demands of various interest groups upon which organizations depend for resources and support according to the resource dependency paradigm (Pffefer and Salancik, 1978). So, organizations partially or completely depend on others to survive in their environment. The same resource dependency framework is also valid for the departments in organizations. Obtaining resources from other departments and managing/manipulating their demands can be crucial for the success of departmental activities.

Resource dependency theory can be used to question the organizational effectiveness of e-government and e-governance applications. Information system departments of some critical state institutions may depend on other departments and organizations to access required resources and support for their internal operations. Other departments and organizations may also have various dependency relationships to the focal organizations or departments. The objective of this study is to determine interorganizational and interdepartmental resource dependency relationships of a state institution's information system department. Network analysis techniques were used to map the mutual resource dependency relationships.

Key Words: *Resource dependency theory, network theory, network analysis,*

JEL Classification: L 32

1. INTRODUCTION

Information age has created tools to ease information dissemination and flow through society. Some of the working areas have been erased and some others ranging from public services, health and various fields of business have emerged as a result of rapid improvement of information and communication technologies. These tools have also changed the design of contemporary organizations and readjusted management practices. E-government applications and services have undertaken a critical role on overcoming time and distance barriers for multiple interest groups. The links between government and interest groups can be classified under three groups according to Kaya and Çetin (2009); government to citizens, government to business and government to government. Accordingly, e-government applications provide a bridge in terms of information exchange between society and state and also help to carry information to the market related to regulations and enables coordination between state institutions.

The willingness of state institutions to participate in various types of e-government applications is an important factor which determines the success of investments. High level of bureaucracy and tendency towards status quo are the basic characteristics of state institutions. Governments are traditionally more conservative, slower to towards changes and also in adopting innovative applications than the interest groups they serve (Davidson, Wagner and Ma, 2005). This resistance to change can be explained by various social, technological and political factors. Scholars (Layne and Lee, 2001; Lee and Kim, 2007) have focused on socio-technical aspects of internal operations and procedures to resolve this problem. Through these efforts models to find a fit between technological and behavioral or structural design aspects of organizations have been tried to be developed. The focus of researchers to the internal processes aimed at reaching high level of efficiency in terms of system's conversion process. But, the question of how to reach the required inputs to give e-government services effectively to the various groups has been ignored. The departments in public organizations which are responsible from giving e-government services may depend on their environment to reach resources. This situation inevitably forces these departments to manage their relations with the other departments or organizations which have a control over the resources critical for implementation of e-government projects. Additionally, IT departments or state organizations as a whole that are directing the information flow through the state system, the non-profit or business organizations and to the citizens have to take the political support from the beneficiaries. So, the priority has to be given to search the environment and e-government relationship in terms of resource acquisition instead of internal process design.

The success of e-government activities primarily linked with the effective management of relations with the critical actors who have control over resources in the environment. But the degree of dependency relationships may contingent upon several factors. For example, even selection decisions among information system design alternatives -in-house design or outsourcing- can create different kind of dependencies. One of the main problems concerning environment e-government interaction is to determine the identities of the actors –other organizations, departments, individuals- who create a dependency relationship over state organizations or IT departments which are dealing with e-government applications. This kind of a study may reveal common dependency factors and give scholars a chance to design strategies and models showing how to cope and manage dependency networks for the relevant state institutions or the departments. Another important issue is to decide the type of asymmetric dependency relationship of the focal organization/department with the actors in their environment. Some interest groups or organizations inside or outside the state system may also depend on the information generated or

provided from the e-government applications. This asymmetric dependency relationship in favor of the actors conducting e-government business gives them a chance to effect their environment. Resource dependency theory (Pfeffer and Salancik, 1978) provides different insights to evaluate environment – e-government relationship in detail.

2. RESOURCE DEPENDENCY FRAMEWORK

2.1. Resource Dependency Theory

Closed system perspective of organizations had dominated the management field since 1950's. Classical and neoclassical management approaches focused on the technical and behavioral aspects of organizational processes. Trends towards holism have caused the rise of open system perspectives during the post war period. General systems theory (Bertalanffy, 1940, 1950) has partially led the holistic and antireductionist movement and has created a background for the development of some important theories in the field of management and organization. Contingency theory can be seen as one of the most important adaptation of open systems perspective to the field of organization theory. A group of authors' (Burns and Stalker, 1961; Woodward, 1965; Thompson, 1967; Lawrence and Lorsch, 1967 and Galbraith, 1973) interrelated propositions which aiming at explaining the organizational effectiveness with the fit between contextual and structural variables have joined under the heading of contingency theory. Contingency theory widely deals up with the relationship of organizations and their environment. Population theory (Hannan and Freeman, 1977) which explains change in the population of organizations with the natural selection paradigm is another product of open systems perspective. Theories (Granovetter, 1973, 1985; Bordieu, 1983; Coleman, 1988 and Burt, 1992) related to organizational networks have brought different insights to organization-environment interactions. Resource dependency theory (Pfeffer and Salancik, 1978) approaches environment interactions with a different perspective from all other theories explaining organizational phenomena with open systems perspective.

Organizations as open systems bound up with several factors surrounding their environment. They have to access to the required resources and support to convert inputs into outputs. Thus, they depend on others with which they exchange resources, information or labor (Pfeffer, 1976). Those interest groups on which the organization depend for resources and support may have demands in return and the organizations survive to the extend that they manage demands of those interest groups effectively (Pfefer, 1978). Organizations as open and social systems have to make routine transactions with the others in their environment (Pfefer, 1976). These transactions can create mutual dependencies and an integrated system which means performance of focal organization can have an effect on others or vice versa (Pfeffer and Nowak, 1976). Individuals in organizations whether managers or regular staff have a minimum effect on outcomes because decisions may require approval of other actors (Pfefer, 1978). Resource dependency network of relations leaves no room for the independent managerial action or adjustments of individuals in organizations. The environmental constraints hinder independent behavior of the individuals and assign a symbolic and a passive role to the managers. Resource dependency perspective (Pfeffer, 1978) proposes strategies to control or to manage conflicting demands of the interest groups for the survival of the organizations.

Resource dependency theory is closely related with power distribution between and within organizations. Power has been defined as a function of dependence and it is A's ability to create an effect on the behavior of B in a desired direction by using dependency relationship (Schein, 1977). Clegg (1989) reinterprets power as capacity of an actor to create dependency over others by controlling organizational resources. Interdependencies are usually not balanced or symmetric (Pfefer, 1978), organizations depend on others or others may depend on focal organizations with varying degrees. Thus, the degree of two types of asymmetric dependence shows the power of environmental forces on focal organization or organizations' ability to control their environment.

State institutions which serve to the information needs of the other state organizations, citizens, NGO's and profit firms with e-government applications may have many dependency relationships with the beneficiaries or the authorities providing resources and support. But, it is required to examine this perspective under interorganizational and intraorganizational level. The two level of analysis in this study indicates how effective an e-government application to control internal and external environment is.

2.2. Interorganizational Resource Dependency

State institutions that are involved in G2G, G2C and G2B activities may face with specific type of dependencies relevant to the nature of their business activities. The coordination requirements with the other institutions to conduct routine job activities may differ according to the goals or organizational features of the state institutions. But, the same is not true for e-government applications. Mostly information system departments of the state institutions undertake the burden of e-government applications of such organizations. This role broaden the scope of business activities of IT departments in state organizations. Information departments have to provide financial support, technical expertise, equipments, data or information from other governmental, semi-governmental or business organizations. These IT departments also require approval of the stakeholders or state authorities to gain legitimacy (Dimaggio and Powell, 1983). Thus, it is possible to find similar patterns of interorganizational dependency relationships for all IT departments in state institutions which are engaging in e-government activities.

The amount of coordination requirements with the other organizations to conduct daily e-government activities is another important factor which determines the ability of relevant institutions to control their environment. The coordination between organizations is a function of degree and type of organizational interdependence according to Lit-wak and Rothman (1970). Organizations show tendency to form network ties with the others when the resources are scarce and they have difficulties to obtain them from their external environment (Oliver, 1990: 250-251). Mutual cooperation based relationships between organizations start with low trust, less risky, small and official interactions (Ring and Van De Ven, 1976: 25).These interactions turn into embedded relations with passing time and the members of the network gather considerable amount of information about skills, trustworthiness and appropriateness of others during this period (Gulati and Gargulio, 1999). Interorganizational relations aim at reaching common objectives or protecting self-interests of the parties (Van De Ven, 1976). Dependency to information or other resources may increase level of social interactions between state institutions. Social tie formation with the critical individuals who have an initiative over resource utilization or distribution decisions may ease transfer of resources to the focal organizations.

In this study we are more concerned with the dependency relations instead of social relations between state institutions. The main focus of this study is to create a map of dependency relationships of a state institution which conducts e-government applications. Information system departments were taken as a unit of analysis because their dependency relationships represent the whole institution's level of resource dependency to the others concerning sustainability of e-government activities.

2.3. Interdepartmental Resource Dependency

Resource dependency framework is not only applicable to organizational level analysis but also valid for the departments in organizations. Pfefer and Salancik (1978) emphasized that power of a department in an organization is a function of the amount of resources contributed by the department. The subunit power is an important determinant of budget allocations within organizations (Pfeffer and Salancik, 1974). But, not all departments are equally influential or effective within the organization (Perrow, 1970). The power of departments is a function of (a) the ability to cope with organizational uncertainty, (b) the substitutability of subunits to cope with uncertainty; and (c) the centrality of the subunit in the organization's workflow (Hickson et al., 1971). There are several bases of power defined in the relevant literature. This study is more related to resource dependency based power distribution as noted by Pfeffer and Salancik (1978).

E-government has changed the role of IT departments in the state institutions as mentioned before. IT departments have to reach required resources and take sufficient support from other departments to sustain their activities. A lack of resource flow to these departments may create negative consequences for the stakeholders of e-government applications. There can be mutual dependency relationships between IT departments and the other department in an organization. In general, IT departments have important positions in organizations. Because, the information infrastructures of organizations are designed, maintained and operated by the professionals in those units. It is logical to talk about the dependency of other departments to IT departments in general. But, the database operations concerning e-government activities can create controversial dependencies.

3. RESOURCE DEPENDENCY OF E-GOVERNMENT APPLICATIONS

This study is neither a conceptual framework nor an empirical study to test some hypothesis regarding resource dependency relationships. We are more interested in mapping the resource dependencies between organizations and departments in an organization. The interaction between IT departments of state institutions and the environmental factors surrounding them is the main focus of this study. Organization theory gives the scholars the required tools to examine the ongoing relationships between environment and organizations. Resource dependency paradigm (Pfeffer and Salancik, 1978) like organizational ecology (Hannan and Freeman, 1977), contingency theory (Burns and Stalker, 1961) and neoinstitutional theory (DiMaggio an Powell, 1983) deal with how organizational action is limited by the determinism of the environment. Resource dependency emphasizes obtaining various types of resources from external and internal environment to sustain business activities. An organization can have a chance to survive by meeting or managing the conflicting demands of the sides providing support for the operations. It is possible to offer some strategies to cope with the conflicting demands of the environment. But, first it is required to reveal identity of the other organizations or departments which focal organization or department depends on to continue its operations.

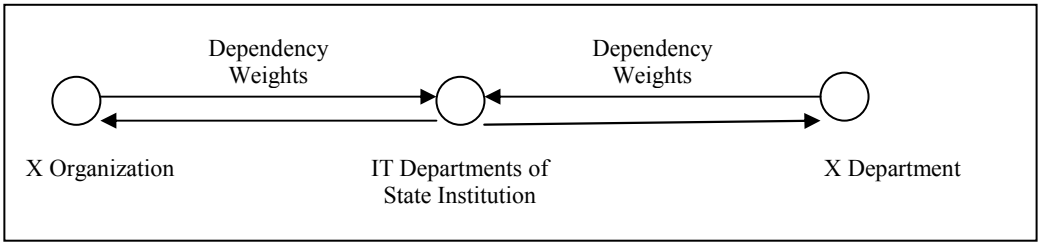
It is important to determine common actors which state institutions depend on for resource acquisition before offering strategies to manage those dependencies. So, there are three objectives of this study; (1) to map the other organizations which the departments of the state institutions conducting e-government activities depend on for obtaining resources, (2) to determine the dependency of IT departments of other departments or units in the relevant institution dealing with e-government, (3) to measure the degree of resource dependency of the state institutions and IT departments to their internal and external environment.

4. METHODOLOGY

Network research methodology is common if there are interactions between any kinds of elements. Those elements can be subatomic particles, molecules, neurons, workers, social groups, organizations and even countries. Network methodology has fundamental differences from other fields of sociological inquiry in terms of methodology and area of focus (Emirbayer and Goodwin, 1970; Monge and Contractor, 2001; Parkhe, Wasserman and Ralston, 2006; Dhanaraj and Parkhe, 2006). Scholars who attempt to explain interactions via network analysis refuse reductionism and they focus on relations between parties instead of searching the correlations of dependent and independent variables (Emirbayer and Goodwin, 1970:1414). Social network analysis has been used as a methodology in organizational research to explain interaction patterns in interorganizational and intraorganizational networks. This alternative methodology has also been very popular in the field of economic sociology. The idea of this study is to use same analysis techniques to map resource dependency relations between parties. Nodes are the organizations or individuals and edges or connections are social relations between parties in social network research. Edges or connections are assumed as dependency relations instead of social ties in this research.

This study covers two departments of an important institution which has a leading role in e-government applications. The aim of this state institution is to enable coordination of all organizations in the state system. Thus, it undertakes an important role especially for G2G e-government applications. This study is an attempt to map resource dependency relations of the state institution. The scope of this research will be broadening in the future. These two departments are IT departments which are responsible from e-government activities of the state institution. The responses of the employees and managers are collected to form a dependency network

Figure-1: Measuring Resource Dependency



The generally accepted method for data entry is to form a network matrix by symbolizing the existence of a relationship with 1 and the absence of a relationship with 0 (Hanneman, 2001). The matrix in this study was filled by the responses of the employees working in two departments responsible from conducting and sustaining e-government activities. First the respondents were asked to indicate the names of the other organizations and departments in their institution which they depend on for resource acquisition. The names of the organizations and department which depend on theirs' were asked on the second stage. Weights of the dependency relationships assigned according to the responses of the employees. If the respondents give same organization's or department's name more than once, each repetition increased the value of existing dependency tie by 1. The main purpose of assigning weights according to the employee perceptions is to determine the highest ranking departments and organizations which the two departments depend on to sustain e-government activities.

Centrality calculations are important to determine the dependency rankings. Indegree which means total number of ties from other actors to the focal actor (Jablin and Putnam, 2001) was used to rank other departments and organizations which depend on the two IT departments for conducting their routine operations. Outdegree which means the total number of ties from focal actor to the others was used to show the ranking of the actors the two departments depend on for resource acquisition.

5. ANALYSIS and RESULTS

The responses of the employees working in the two IT departments which are responsible from e-government applications were collected to form the network matrix. In the first phase of the research the names of the other organizations were entered as nodes of the network. Then, the mutual dependency relations with focal organization were entered according to weights between 1 and 10. The weights which represent degree of resource dependency between parties are assigned according to the formula given below:

$$\left(\frac{\sum i_1}{N_1} + \frac{\sum i_2}{N_2} \right) / 2 = Weights$$

i1:weights assigned by employees working in IT department1.

i2: weights assigned by employees working in IT department2.

The responses of the employees working in two departments converted to organization's average weights of each node in the network by the formula given above.

Table 1. Centrality Analysis of Interorganizational Dependency Network

	1	2	3	4
	OutDegree	InDegree	NrmOutDeg	NrmInDeg
1 State Institution X	74.000	47.500	46.250	29.688
11 Prime Ministry	9.000	10.000	5.625	6.250
6 Ministry of Finance	7.500	10.000	4.688	6.250
4 Undersecretariat of Treasury	7.500	10.000	4.688	6.250
9 EU Commission	5.500	2.000	3.438	1.250
7 IT Firms	5.000	5.500	3.125	3.438
5 Statistical Institute	5.000	10.000	3.125	6.250
3 Undersecretariat of Customs	2.500	7.000	1.563	4.375
17 Türksat	1.500	0.500	0.938	0.313
16 General Directorate of State Archives	1.000	2.500	0.625	1.563
2 Central Bank	0.500	7.500	0.313	4.688
14 Informatics Association of Turkey	0.500	0.000	0.313	0.000
12 OECD	0.500	0.500	0.313	0.313
8 Consultancy Services	0.500	1.500	0.313	0.938
15 Türk Telekom	0.500	5.000	0.313	3.125
13 IMF	0.500	0.500	0.313	0.313
10 World bank	0.000	1.500	0.000	0.938

Network Centralization (Outdegree) = 44.395%
Network Centralization (Indegree) = 26.797%

Degree centrality scores show the degree of dependency of the focal organization to other organizations and visa versa. Outdegree centrality scores show the state institution's dependency to other organizations and indegree centrality scores shows the other organizations' dependency to the state institution. The state institution's individual outdegree score is higher than the indegreee score. This means the institution is dependent to its environment in terms of resource acquisition in general. The most important organizations which dependent on are Prime ministry, Ministry of Finance, Statistical Institute and Undersecretariat of Customs. It is surprising to see average level of dependency of the organization to the private IT firms which designed technical infrastructure of e-government applications.

Figure-2: Interorganizational Dependency Network Diagram

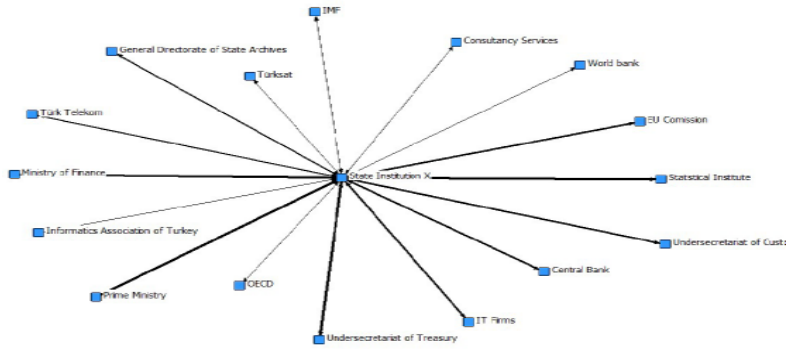


Table 2. Degree Centrality Scores of Interorganizational Dependency Network

		1	2	3	4
		OutDegree	InDegree	NrmOutDeg	NrmInDeg
1	IT / E-Gov Departments	49.000	51.000	49.000	51.000
3	Top Management Office	10.000	10.000	10.000	10.000
4	Human Relations Dep.	8.500	1.500	8.500	1.500
11	Dep. of Strategy Development	7.500	0.000	7.500	0.000
10	Department of Finance	7.500	2.500	7.500	2.500
2	Procurement Dep.	7.000	9.000	7.000	9.000
5	Payment Office	5.500	6.000	5.500	6.000
9	Publication and Public Relations Office	4.000	8.500	4.000	8.500
6	Technical Services	1.000	3.500	1.000	3.500
8	Regional Development Office	0.000	4.000	0.000	4.000
7	Economic and Social Research Office	0.000	4.000	0.000	4.000

Network Centralization (Outdegree) = 43.900%
Network Centralization (Indegree) = 46.100%

Table 2 shows indegree and outdegree scores of interdepartmental resource dependency network. In general other departments in the state institution depend on (indegree score is higher than outdegree) the two IT departments to conduct their operations. Procurement department and publication and public relations office have a high dependency (indegree) to the focal departments. Not surprisingly the two departments responsible from e-government operations have highest dependency to the top management of the institution. Human relations, strategy development,

finance, procurement and payment units or departments have high dependency (outdegree) scores. This finding means the e-government operations in the institution require the flow of resources especially through these departments.

6. CONCLUSION and SUGGESTIONS

The results show that the state institution has high level of resource dependency to its external than the internal environment. The highest ranking organizations (Ministry of Finance, Prime Ministry, Undersecretariat of Treasury) are the state institutions which are critical to take political and financial support. The findings emphasize the importance of sustaining information and data flow from Statistical Institute of Turkey to enable e-government applications for the focal institution. The institution has lower level of resource dependency to NGO's, IT firms, institutions providing telecommunication infrastructure or services and international organizations. So, the state institution has to manage its relationships especially with the others in the state system to access required support for the ongoing e-government operations.

The direction of dependency relations inside the institution seems to be in favor of the two IT departments. IT departments need resources and support from some of the departments or units like procurement, finance and human relations. But, those departments or units must have good relations with IT departments to benefit from technical expertise and maintenance services. This situation gives a power base and a privileged status to the IT departments in organizations. Thus, those departments can easily effect the resource allocation decisions for their self interests.

In conclusion, it is not difficult for the state institution to control its internal environment to enable e-government applications. It is more important to focus on the external environment. The demands of the other organizations should be carefully managed to provide resources and support for e-government applications. The findings of this study are not representing all state institutions. The future studies should be covered all state institutions. By this way it will be possible to determine common actors create resource dependency in terms of e-government.

BIBLIOGRAPHY

Bertalanffy, L. (1950), The Theory of Open Systems in Physic and Biology, Science, 3, 23-29.

Bertalanffy, L. (1940), Der Organismus als Physikalisches System Betrachtet, Naturwissenschaften, 1940, 28, 521-531.

Bourdieu, P. (1983), Forms of Capital. Handbook of Theory and Research for the Sociology of Education, 241-258.

Burns, T. and Stalker, G.M. (1961), The Management of Innovation, London: Tavistock.

Burt, S.R. (1992), Structural Holes: The Social Structure of Competition. Harvard University Press.

Clegg, R.S. (1989). Radical revisions: Power, discipline and organizations. *Organization Studies*,

10, 1, 97-115

Coleman, J.S. (1988), Social Capital in the Creation of Human Capital, American Journal of Sociology, 94: 95-120.

Davison, R. M. , Wagner, C. and Ma, C.K.L. (2001), From Government to E-government: A Transition Model, *Information Technology and People*, 18,3, 280-299.

Dhanaraj, C. and Parkhe, A. (2006), Orchestrating Innovation Networks, *Academy of Management Review*, 31, 3, 659-669.

DiMaggio, P. J. and Powell, W.W. (1983), The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields. *American Sociological Review*, 48: 147-160.

Emirbayer, M. and Goodwin, J. (1994), Network Analysis, Culture and the Problem of Agency,

American Journal of Sociology, 99, 6, 1411-1454.

Galbraith, J. R. (1973), Designing Complex Organizations, Reading: MA: Addison-Wesley.

Granovetter, M. (1973), Strength of Weak Ties, American Journal of Sociology, 78: 1360-1380.

Granovetter, M. (1985), Economic Action and Social Structure: The Problem of Embeddedness, American Journal of Sociology, 9, 3, 481-510.

Gulati, R. and Gargulio, M. (1999), Where do interorganizational networks come from? *The American Journal of Sociology*, 104, 5, 1439-1493.

Hanneman, R.A. (2001), Introduction to Social Network Methods. Riverside C.A.: University of California.

Hannan,M.T. and Freeman, J.H. (1977), The population ecology of organizations, American Journal of Sociology, 82: 929-964.

Hickson, D.J.; Hinings, C.R.; Lee, C.A., Schneck, R.E. and Pennings, J.M. (1971), A Strategic Contingencies of Intraorganizational Power, *Administrative Science Quarterly*, 16, 216-229.

Jablin, F.M. and Putnam, L.J. (2001), The New Handbook of Organizational Communication : Advances in Theory, Research and Methods, Sage Pub.

Kaya, M. and Çetin, E. (2008), Harnessing ICT to Improve E-Government and E-Governance, *1st ICEGEG Proceedings*.

Lawrence, P.R. and Lorcsh, J.W. (1967), Organization and Environment: Managing Differentiation and Integration, Boston: Harvard University.

Lee, J. and Kim, J. (2007), Grounded Theory Analysis of E-Government Initiatives: Exploring Perceptions of Government Authorities, *Government Information Quarterly*, 24, 135-147.

Monge, R.P and Contractor, S.N. (2001), The New Handbook of Organizational Communication : Advances in Theory, Research and Methods, Sage Pub.

Oliver, C. (1990), Determinants of Interorganizational Relationships: Integration and Future Directions, *Academy of Management Review*, 15, 2, 241-265.

Parkhe, A.; Wasserman, S. and Ralston, A.D. (2006), New Frontiers in Network Development, *Academy of Management Review*, 31, 3, 560-568.

Pfeffer, J. (1976), Beyond Management and the Worker: The Institutional Function of Management, *Academy of Management Review*, 36-46.

Pfeffer, J. and Nowak, P. (1976), Joint Ventures and Interorganizational Inter-dependence, *Administrative Science Quarterly*, 21, 398-418.

Pfeffer, J. and Salancik, G.R. (1978), The External Control of Organizations: A resource Dependence Perspective. New York: Harper & Row.

Ring, S. P. and Van De Ven, H.A. (1994), Developmental process of coorperative interorganizational relations. *Academy of Management Review*, 19, 1, 90-118.

Schein, E.V. (1977). Individual power and political behaviors in organizations. *Academy of Management Review*, 2, 1, 64-73

Van De Ven, H.A. (1976), On the Nature, Formation and Maintenance of Relations Among Organizations, *Academy of Management Review*, 1, 4, 24-36.

Thompson, J. D. (1967), Organizations in Action, McGraw-Hill.

Woodward, J. (1965), Industrial Organization: Theory and Practice, London: Oxford University Press.