A CONCEPTUAL MODEL DESIGN FOR AGGREGATED PUBLIC BROADBAND PROCUREMENT ON THE REQUIREMENTS OF TURKISH GOVERNMENT

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—Abstract —
Along with e-government transformations, broadband access needs of public institutions gradually increases. In order to meet this increasing broadband access needs efficiently and under central control gains more importance. From this perspective, Turkish Government added this issue into its e-government action plan. This paper firstly provides a basic conceptual system design model according to the requirements of RIS-107 numbered e-government project of Turkish Government whose name is Aggregated Public Broadband Procurement of Turkish Government Institutions. Additionally to these requirements, some specialties like operating optimized, autonomous and real-time, which a modern supply chain management system can realize, are added into the new design to solve the some of the project problems declared by Turkish Ministry of Transport.Then, some similar projects and articles which can be beneficial for the solution are examined. Based on the conceptual model design and implications, future research questions are determined to lead the future studies for aggregated public broadband procurement and some advices are presented according to referenced materials.
Key Words: *Public broadband procurement, aggregated demand, aggregated offer,e-procurement, aggregated procurement*
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1. INTRODUCTION

1.1 Brief Explanation of the Topic

While the importance and need of broadband services are increasingly growing, the role that governmentsshould play in its development is also being more and more questioned. (Ex., Kelly 2009). Various studies suggest that governments

strategically prioritize and plan various broadband service developmentsfor their countries (for such as less-developed, remote, rural regions, or general public procurement). (Ex. for UK, (Gunston 2002); for Italy, (Battisti 2002); for U.S.A. Northern California,(Steinberg, Degagne, and Gough, 2008); for Denmark, (Berg 2002).)

For Turkey also, Turkish State Planning Organization (SPO) has incorporated a public broadbandprocurement action into the country 2006-2011 strategic plan for becoming an Information Society (SPO 2006). As the program definition document underlines, today, the increasing use of computers, electronic data flows, widespread intra-institution and inter-agency sharing of practices and information, more alternative electronic channels for citizens and businesses grow the need for broadband access services gradually. On the other hand, it is expected to make broadband services meet the growing access need of information society and reach the penetration to be able to offer access services to the rural public institutions and organizations.(SPO Program Definition Document, 2006) Meanwhile, to procure the broadband access services for public needs in an aggregated form, due to huge size of aggregated demand, will decrease the broadband access costs by increasing the bargaining power of public procurement institutes.Besides, operators have to extend their infrastructures in a way to provide broadband access services to the rural areas. Due to these reasons, RIS-107 Aggregated Public Broadband Procurement project was developed by Turkish Ministry of Transport in April 2007.

1.2. Purpose of the Study

Public institutions are among the biggest consumers of broadband technology. These big consumers demand a huge broadband service every year. RIS-107 Aggregated Public Broadband Procurement project was developed by State Planning Organizationin order to evaluate this huge demand, but the project was stopped in order to be reevaluated by Turkish Ministry of Transport due to two reasons; first one is quantity and time differences in the demands and needs of public institutions throughout the country; and the second one is differences in budget appropriation and supply procedures of public institutes (SPO 2008, 2010). In this context, the primary purpose of this study is to define a conceptual model for this project which can be useful while solving the project problems. Also, the study will examine some similar projects in the world in order to be referenced as real examples.

1.3. Why this study should be performed?

Due to basic and most important broadband users are public institutes, public broadband facilities are placed at the center of the strategies of service providers. In addition, at the government side, broadband expenditures are at the very important level in the governmental budgets. Thanks to these reasons, there is a need for a central system which can arrange these public broadband procurement transactions. From this perspective, at the government side this issue is transformed into a project, Aggregated Public Broadband Procurement, but this project has not been started yet due to reasons mentioned. Clearly, there is a need to determine a conceptual plan for this project and to find solutions for not being started of the project.

Creating a conceptual model will help to understand the problem more clearly. By this method, it is easy to modularize the system and to create solutions to these modules. Also, by tracking over the system modules, how a transaction will be ended and will affect the whole system will be determined.

All predefined problems have significance role for the project success. After the examination of the conceptual model operation, possible system problems will be guessed. This will add important contribution to the success of Aggregated Public Broadband Project.

Currently the Information Society Strategy is also over and no new formal initiatives have been publicly available for guiding government agencies and other stakeholders to decide upon what to do next. Within these circumstances, we hope this work will contribute to development and implementation of new initiatives for public broadband procurement, as the need arises.

2. DEVELOPMENT PROCESS

2.1. Brief Overview of the Study

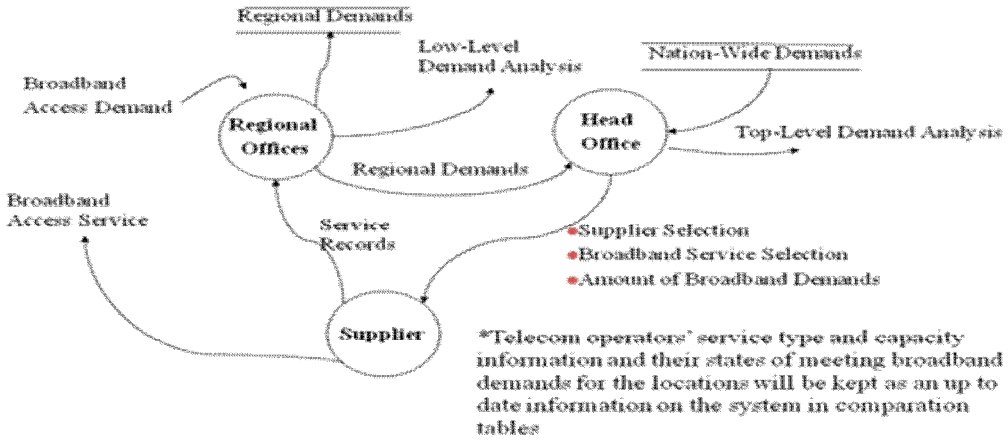
In order to achieve the study, first step is to make a data flow diagram for the conceptual model. For this, the functions, file/database definitions, input/output entity and flow types are determined. Then, all these entities are combined into one whole system. All the definitions and arrangements will be done according to governmental procedures. To create the combination, supply chain, demand management and offer management systems will be considered.

Due to the fluctuations in the demand side will reversely affect the system operation; demand forecasting will be used to provide stability to the system. In addition, demand forecasting will also take charge in regulating the service provider side in order to response the new demands quickly.

After creating the conceptual model, it will be researched that if this conceptual model is operated in real, what its results will be. For this, case studies will be conducted in governmental institutes and service providers. In addition, to research the user responses to the system, surveys will be conducted in user side in public institutes.

2.2. Basic Conceptual Model

Figure-1: Basic Conceptual Model for Aggregated Broadband Procurement

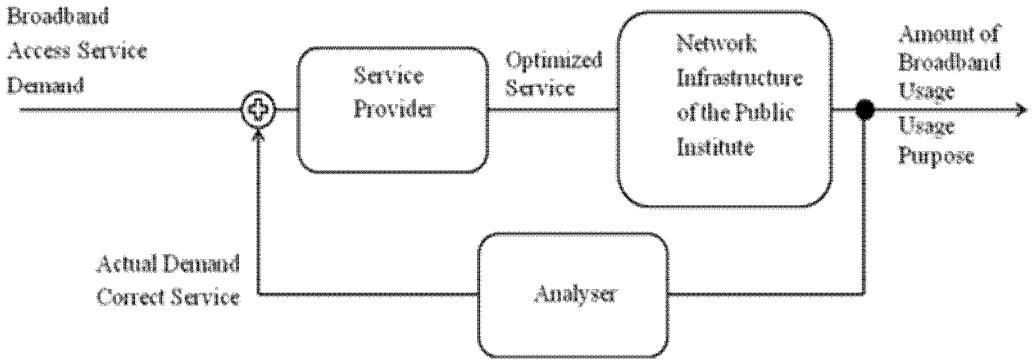


In the beginning, a physical data flow diagram was developed to show the general concept of the desired system. In this conceptual model, regional offices and head office represent the public institutes in charge with collecting and evaluating the broadband demands, supplier represents the broadband service providers. Firstly, broadband access demands are stated to regional public offices by the technical departments of the public institutes. In these offices, these demands are stored in a local database and then analyzed whether they are proper in terms of demand quantity and demand aims. Then regionally analyzed demands are sent to the head office. In the head office, all the demands are analyzed according to the nation-wide policies and stored in the central database. The capacities and service types that Telecom operators can provide are sent to the head office regularly and this

information is stored in a comparative manner. According to this comparison, suitable service provider(s) is/are selected for aggregated demands. By selection the service provider according to aggregated demands, powerful competition among the service providers is realized. This competition enables decrease in service costs for the broadband access. In the end, service providers transmit their services to the public institutes and service records to the regional offices.

2.3. Solution Model for the Problems

Figure-2: Supplement Model for Solution



One of the problems declared by Ministry of Transport is that there are quantity and time differences in the demands and needs of public institutions throughout the country. Yes, it can be difficult to follow these broadband demands and needs. We tried to develop a solution model for this problem in this section.

In the basic conceptual model, firstly, aggregated demands have been sent to the service providers by head office. In this first phase there is no optimized service can be presented, it is possibly same with the demand of the public institute. After providing the service to the public institute, amount of broadband usage and usage purposes are determined by the service providers. For this, bandwidth utilization and type of service techniques can be used. For practical operations, Skap and MRTG programs can be advised. After determination of these amounts, they are sent to the analyzer (analyzer is possibly another public institute which audit broadband expenditures) to control the accuracy of the demand with the real usages. Analyzer will decide that suitable demand values. Probably, these values would not be same with the actual usages; there should be a safety gap for the demand fluctuations. In the second iteration, broadband access service demand and actualized service demand are combined in head office and optimized service

is demanded. In the second iteration, more optimized service is presented to public institutes and new usage values are determined.

2.4. Similar Projects and Related Articles

Demand Aggregation to Encourage Infrastructure Rollout to Under-Served Regions-Italy(Battisti, 2002): In order to realize the demand aggregation, there are some companies and systems are used in Italy. Two of them are Consip and RUPA. The company Consip which is owned by Italy Treasury rationalizes the public spending for goods and services (Battisti, 2002). RUPA is a network system connecting central agencies of the Public Administrations. It is a set of interconnected VPN which is provided and managed by IT companies. Central administrators in Italy must use RUPA as their intranet for interoperation among them; also local administrations can use RUPA both to host their intranets and to access RUPA for interoperation. In Italy, the roles of demand aggregation can be defined as an increasing coordination of different actors' programs and efficiency of procurement procedures.

Oregon Broadband Mapping and Demand Aggregation Project Proposal (Oregon, 2009): This project proposal aims to offer a final report for promoting broadband investments and usage in Oregon which is a state of USA where digital divide highly manifests. "This final report will provide a comprehensive analysis of broadband availability, demand and infrastructure gaps throughout Oregon with recommendations for improvement. (Oregon, 2009) In order to accomplish the final report, data collection is performed by conducting surveys, demographics and community meetings. Examples of community surveys, telephone surveys, business and institutions technical surveys can be found at appendixes in the proposal. In addition,for data mapped GIS technology is used to produce layered maps portraying the collected data.

Broadband Demand Aggregation: Planning Broadband in Rural Northern California(Steinberg, 2008): This study examines market demand, availability and infrastructure issues by GIS(Geographic Information System) tools in rural northern California. For this project, Redwood Coast Connect initiative was launched in rural four areas of northern California. Important aspect of the project was the determining of successful broadband deployment which requires considering five issues: "access, applications, affordability, accessibility and assistance." The long-term goal is to make an available ubiquitous broadband to

the rural areas of northern California. There are some phases for realizing this aim:

- Setting strategies, actions, desired specific outcomes. It is determined by community meetings with businesses and community members throughout the RCC region.
- Developing an understanding of the demand for broadband by written, phone and online surveys of current and potential business and residential customers.
- Geocoding of survey data to the address of the current or desired broadband access and combining with a variety of physical infrastructure and environmental data to develop better understanding of both current broadband availability and the potential for extending access to areas with unmet demand.

ArcGIS 9.2 is used by Institute for Spatial Analysis for analyzing of the geospatial data; scenario modeling was developed with CommunityViz Professional 3.1. GIS Analysis Steps are provided below:

- Acquiring and evaluating available data covering the areas at the state, country and municipality levels.
- Merging the layers containing similar information into a single data layer. For example, combining the providers' broadband footprints into a single broadband access footprint layer.
- Creating additional data layers from survey information, hand digitizing and data extraction from other sources.
- Reducing the data layers and compiling them into a comprehensive geodatabase to be accessed via ArcGIS Server online mapping system.

Thanks to this work, broadband coverage maps and broadband demand areas were met in one geocoded survey. This data is now being used by telecommunications consultants and policy-makers in RCC initiative.

For this project, there are two important products developed by the Institute for Spatial Analysis which can be useful examples for Aggregated Public Broadband Procurement Project of Turkey:

1. Online Mapping Tool: This map tool provides online detailed information to telecommunications consultants in RCC project via an ArcGIS server interactive map. The tool includesfour main important information for demand aggregation:
    - Demand location,
    - Willingness to pay,

- Variety of other important factors derived from the georeferenced survey data,
- Other geospatial data sources acquired and developed.

2. Interactive Modeling Tool: This modeling tool provides easy exploration of scenarios for extending broadband coverage. It is developed by using the CommunityViz 3.1 software extension for ArcGIS. It permits its users to set parameters based on distance to new extended coverage, number of new customers desired, costs per mile to extend the infrastructure. All the setting activities are done in an interactive mapping based environment and when the user alters any values in system, the ArcGIS map display is updated under the given scenario. (Steinberg, 2008)

Aspects Regarding the Interdependence between Aggregated Demand and Offer (Macriş, 2008): This paper, written by Lecturer PhD Student Maria Macriş, University of Petroşani, focuses on the interdependence between global aggregated demand and aggregated offer. Aggregated demand and aggregated offer curves are defined in terms of level of prices and gross national product. The intersection point of the two curves is defined as the balance point between aggregated demand and offer. From the relationship perspective between the aggregated demand and offer in broadband access market regulation, this study can be considered as a valuable resource. Some of the important points of the paper are:

- "Balance between aggregated demand and aggregated offer is the equality between the offered quantity and the demanded quantity of national production."
- "On a short term, the changes of aggregated demand are the most significant ones in determining prices variations; on a long term, the prevailing elements of prices evolution are the changes of aggregated offer."
- "When aggregated demand does not change, the general index of prices diminishes, balance quantities of demand and offer increase…When aggregated demand does not change, and aggregated offer decreases the general index of prices grows; balance quantities diminish, the prices of productive factors increase, production costs increase, prices grow…When aggregated offer does not change, and aggregated demand grows as compared with balance level the general level of prices increases and national production increases"

In short terms, aggregated demand and offer policy is necessary for the market regulation, decreasing inflation and increasing controlling productivity. There also additional comments on other macro economic impacts such as on GNP (Global National Production) (Macriş, 2008)

2.5. Planned Research Questions

In the future studies, to create the proper conceptual model for the Aggregated Public Broadband Procurement and to determine criteria for the project success, these research questions will be answered by surveys and case studies:

- R1: How can a demand aggregation system be developed for broadband access demands of public institutes?
- R2:How can an offer aggregation system be developed for broadband access service offers for public institutes?
- R3: How can the broadband access need assessments of public institutes be carried out?
- R4:How can an appropriate broadband service provider be selected?
- R5:Are all the public institutes able to procure broadband by an aggregated procurement method?
- R6:Do all the public institutes rely on aggregated broadband procurement?
- R7:Does whole sale purchase give an advantage to public institutes?
- R8:Does aggregated broadband service procurement extend the country-wide broadband service investments?

3. CONCLUSION

This paper briefly examines the RIS-107 numbered e-government project of Turkish Government whose name is Aggregated Public Broadband Procurement of Turkish Government Institutions and tries to produce basic conceptual model for this project. Developed basic conceptual model may provide easier way to understand the problem of aggregated demand and aggregated procurement. In this way it may be useful in development of the project; also alternative solution model may be a solution for some of the project problems. At the end of the paper some similar projects are examined.

To sum up these projects, similar aggregated demand project is executed in Italy via some companies and systems, these companies and systems can be taken as an example. “In Oregon Project Proposal”can be a good final report example for broadband investments for rural areas. Planning Broadband in Rural Northern California Project offers useful application examples for GIS supported

broadband investment activities. Finally, Aspects Regarding the Interdependence between Aggregated Demand and Offer paper examines the relationship between the aggregated demand and aggregated offer, which can be beneficial for analyzing the possible economic results of the Aggregated Public Broadband Procurement project.

At the end of the paper, research questions are determined to validate conceptual models and to lead future studies in aggregated demand and procurement for showing the next phases of our studies.We hope the paper will contribute to ongoing works for public broadband procurement in Turkey and elsewhere in the world.

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