Is VCF a Relevant Alternative for Financing Transport Infrastructure?

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Abstract— Cities are becoming increasingly popular as places for residence and work; more than half of the world’s population lives in urban areas. Demand for transportation infrastructure and services keeps increasing, and so are the costs; meanwhile public resources are becoming less and less available. It is about time to start considering thoroughly the role and importance of accessibility in creating sustainable financing mechanisms. This paper is part of a wider research still in progress and refers to an in depth analysis of the potential of using alternative financing strategies for transportation infrastructure, which are based on the concept of land value capture. The paper includes analysis of the idea behind value capture, the basic methods used, the implementation policies and some of the most representative case studies worldwide. It concludes that, if implemented carefully, value capture models can indeed be a robust financing alternative which could effectively support sustainable urban development.

Keywords—Value Capture Finance, Accessibility, Transportation Infrastructure

I. INTRODUCTION

Cities are becoming increasingly popular as places for residence and work; more than half of the world’s population lives in urban areas, especially in large urban centres but also in medium – sized cities. There are various reasons for this, and usually are associated with advantages such as wide access to jobs, opportunities, people and ideas [1]. UNFPA (United Nations Population Fund) has estimated that until 2030 nearly 5 billion people will live in cities around the world. This projected growth creates huge responsibilities for governments worldwide under the objective of meeting the basic needs of their citizens (provision of water, energy and waste removal), as well as securing the transportation of people and goods. Even the wealthiest nations will struggle in order to find the financial and technical resources to deal with the massive infrastructure requirements [2].

In order to be able to maintain their functionality and support further future growth, urban areas should examine the implementation of innovative infrastructure and land use concepts that enhance development and create a smart city towards the principles of sustainable development. The over – concentration of people and activities in cities can reach a point at which the disadvantages of living there exceed in number the benefits; this is reflected in urban mass transit systems as congestion is sometimes intolerable, especially during peak hours. Therefore, it is easy to realize that public transit is a key success factor for every city. However, although urban mass transit systems has a vital role to play in achieving and sustaining economic recovery, financing of transportation systems is strongly affected by the current economic climate [1], [3].

Transportation authorities are thus facing ongoing challenging nowadays. Demand for transportation infrastructure and services keeps increasing, and so are the capital and maintenance costs; meanwhile public resources are becoming less and less available. A huge gap is hence created between the urban transportation system’s requirements and the financing means existing to actually fulfill them. Transportation specialists worldwide are forced to think creatively in order to bridge the gap. They attempt to continuously find the best responses to the following questions [4]:

- Would it be possible to provide more by using less in the transportation sector?
- Are there any alternative financing strategies which could contribute in achieving the aforementioned objective?

The global economic and credit crisis caused the deterioration of governments’ economic status. This poses an important challenge regarding programs which focus on the transportation sector. Transportation systems should become much more efficient in order to continue providing the same or even better quality of service with less money. Meanwhile, the competitive players of the global economy require an increasingly effective and efficient transportation network, capable of supporting the changing economy. It is about time to start considering thoroughly the role and importance of accessibility in creating sustainable financing mechanisms [5].

II. RESEARCH OBJECTIVES

In this context, this paper is part of a wider research still in progress and refers to an in depth analysis of the potential of
using alternative financing strategies which are based on the concept of land value capture instead of traditional methods to finance transportation infrastructure. The research’s aims are multiple: it attempts to examine the best practices in this field worldwide, identify the strengths and weaknesses of the existing value capture strategies and suggest an evaluation framework for decision makers focusing on Greece, a country where this alternative solution for transportation finance is still quite unexplored and has not been implemented yet, not even in a limited scale for any project.

A first approach is presented herein; initially, there is a brief note on the relationship between increased accessibility and land value, followed by the description of the notion and basic principles of value capture finance. The next section includes a description of the most widely used value capture financing methods and tools across the globe. Moreover, five representative and state of the art case studies worldwide, where value capture tools are currently used or have been used to finance large urban transit investments are analyzed. After that, a general policy outlook concerning the selection and implementation of the suitable value capture tool follows. The paper concludes with some general conclusions drawn and perspectives for future research.

III. VALUE CAPTURE FINANCE

A. Accessibility and Land Value

In the context of investment on transportation infrastructure, exploring alternative financing methods that are characterized by flexibility should be a continuous and essential target, especially within the current economic climate. The application of innovative financing tools based on land value to cities, reveals the strong potential of not only bridging the financial gap, but also delivering sustainable transportation services and enhancing the role of accessibility with regard to urban mass transit [6].

Between transportation systems and land market there is unquestionable interaction, which is interpreted through the concept of accessibility i.e. the ability to access activities and goods that are in demand [7]. Focusing on passenger transport, [8] define accessibility as “the extent to which land - use and transportation systems enable (groups of) individuals to reach activities or destinations by means of a (combination of) transport mode(s)”. Rich literature worldwide proves by multiple research examples that there is strong positive causality between increased accessibility and property values [9], [10], [11] (for an annotated bibliography see [12]). Transport infrastructure development may leverage land development and economic growth and this becomes an incentive for investing in large scale infrastructure [13], [14].

Fig. 1 presents the ways by which land and property value may change after the introduction of new urban transit. The impact of the new infrastructure starts to be increasingly visible after the intention of delivering the project is publicly revealed. The value of nearby properties rises continuously until reaching maximum when the project becomes operational. During the project’s life-cycle a further increase in values might be experienced, following service expansion or/and on – site stimulated urban development [15].

B. Definition and Basic Principles

Financing transportation infrastructure using Value Capture Finance (VCF – also met in the literature as Land Value Capture (LVC)) emerges as an alternative and innovative solution and perhaps its role has never been as crucial before.

The basic notion of value capture is quite simple; according to it, increases in land value that result from urban investments on infrastructure could be “captured” (partially or totally) in order to recover the capital costs of the investment or reinvest in the area. Therefore, in the field of transportation, the term Value Capture Finance refers to a family of public finance mechanisms that raise funds in proportion to the increase in land value associated with new or improved transportation infrastructure and/or services.

There is a circular relation among development of transportation infrastructure, accessibility and value capture (Fig. 2). Transportation infrastructure creates accessibility, accessibility creates value, value can be captured to finance infrastructure and therefore create further accessibility and thus, value [5].

![Fig. 1. Transit Accessibility Premium [15]](image1)

![Fig. 2. The cycle among transportation infrastructure, accessibility and value capture [5]](image2)
Transportation systems’ stakeholders could be divided into direct and indirect beneficiaries. The former term refers to transit users who obviously benefit from the new infrastructure/service while the latter is used to describe individuals or groups (e.g., developers and land owners) whose benefits are not limited to improved transit. Value Capture has hence evolved into an umbrella term which includes a wide range of transportation financing mechanisms based on charging levies or fees on indirect beneficiaries [16]. This is the so-called “benefit principle”, according to which, whoever benefits from a specific service or infrastructure should pay for it.

One of VCF’s basic strengths is that the use of the project after it has been developed can beneficially impact on all stakeholders involved. Moreover, it forces all stakeholders in a transportation project to “think big and rationally”: i.e. to consider the life cycle of the project instead of only the next election period [17], [18]. Generally, financing programs based on Value Capture have the potential to become win-win strategies that promote economic, social and environmental welfare and thus their application should be encouraged and new relevant practices should be constantly arising [19].

C. Main Value Capture Methods and Tools

There are numerous variations of financial instruments based on the notion of Value Capture worldwide. The categorization of them is not an elementary task due to the fact that often different terminology is used in different countries/regions and by different researchers to describe very similar or even identical methods. Therefore, a strict categorization would not serve a specific purpose; value capture methods’ names are flexible and so is their content and usefulness.

In the context of urban mass transit systems, three main methods can be observed [6]:

- Betterment tax: a special tax which is levied on properties which benefit from increased accessibility
- Accessibility Increment Contribution (AIC): an economic development incentive package
- Joint development: cooperation between public sector and private developers

Betterment tax (also known as “benefit assessment”) on the properties which experience a rise in their value often (but not always, as we will see on a London’s case study later on) is applied within a specific geographical zone which is met in the literature with the following terms: Special Assessment District (SAD), Benefit Assessment District (BAD) or Local Improvement District (LID). Property owners within the zone’s boundaries pay an additional tax during the implementation period of this value capture method. A basic attribute of these areas is that they usually require to be approved (by voting) by the majority of land owners before the can be introduced [15]. Moreover, betterment tax could motivate urban growth of higher density, as land speculation by private investors is avoided [6].

As it is usually complicated to determine the exact “influence radius” of a transportation project, it could be argued that defining the boundaries of the assessment district is a procedure with an inherent degree of arbitrariness [20]. Ideally, the tax levied to each property should be calculated separated, after examining the expected benefit from the infrastructure, in order to ensure that the two amounts are equivalent [21]. This is of course very complex and as a result extremely difficult to be implemented in real life.

The basic idea behind the use of AIC as a value capture tool to finance transportation infrastructure is to provide incentives to private parties to invest on specially designed areas, under the objective that the taxes paid there will be used to finance the development or redevelopment of that area [6]. Perhaps the most popular tool that lies under this category is Tax Increment Financing (TIF) and it is widely applied in the USA, where it has its origins (in California, 1952).

The term TIF refers to a financial instrument that attempts to remove physical blight and encourage economic development. Its implementation includes the creation of a geographical district, where the tax base (i.e. the property values) is “frozen” for a long period of time, usually 10 to 25 years, under the assumption that the area would not develop but for the planned intervention and therefore the creation of the TIF district (known as the “but for” requirement) [21].

As investments begin to take place within the TIF area, property values increase, and so is the tax revenue. The new property tax minus the tax on the frozen property values (tax increment) is collected by the TIF authority and used either to repay the capital costs of the investments or to support further development (Fig. 3). The percentage of contribution of TIF mechanism to the total cost of a transportation projects varies; it could start from 15% and reach 50% in some cases [20], [21].

![Fig. 3. TIF districts' function](image)

Almost every State in the US (49 out of 50 – only exception is Arizona) has a legal framework that enables and supports TIF, and there are many examples of TIF implementation across the country, most of which are...
considered successful. However, a more skeptical approach has risen lately among researchers, based on the argument that TIF might trigger favoritism between governments and certain large developers and that a wide portion of the tax base is exempted from general taxation for a noteworthy period of time. Furthermore, the criteria used to characterize an area as “blighted” are not always objective [23], [24].

Joint development involves cooperation between public and private entities to develop an urban project under TOD principles; usually a public transport authority and a real estate developer. From the public authority’s perspective, the aim is to increase revenue and/or the use of public transport. The basic principles of this method are that the private entity is responsible of compensating the public entity though payments or cost sharing agreements and that all parties are involved in the process voluntary, although the result is a legally binding agreement.

The method became popular in the USA during early 1980’s, when 10 new rail systems were financed by the use of it. Nevertheless, it is not used as widely as TIF; some States prohibit by law the involvement of transit agencies in activities related to land use and real estate development. One of the main advantages of joint development is that it does not require identifying the direct and indirect impact of the transportation infrastructure in order to be implemented, as in the case of betterment tax and AIC [6], [21], [25].

D. Case Studies

In this section, five examples of the implementation of different value capture mechanisms are presented. Four of them are located in the United States, and the last one in London, UK. The criteria for selecting these case studies were the novelty of approach, the different mechanisms used, the project scale (large scale projects with a great impact on the cities where they are situated were chosen) and the time framework; four out of five are ongoing projects at the moments this paper is written (2014) and therefore the economic crisis and the financing gap described at the introduction part of this paper is not a theoretical problem to deal with but a real one that should be overcome. The success or not of financing transit through value capture is hence tested in practice and interesting results can be drawn.

- Denver Union Station Redevelopment Project, Colorado, USA

Denver Union Station (DUS) Redevelopment project is an ongoing large scale project in Colorado, USA which includes radical renovation of the existing railway station of the city, in combination with an ambitious transportation program, FasTracks. The basic components of this program, one of the largest transportation programs currently in the USA, involves 197km of rail and light rail tracks, 29km of BRT and 21.000 parking spaces. The total costs are estimated to $7b. Within this context, DUS portfolio reaches $500m. A significant part of this amount is planned to be covered by the use of a value capture mechanism, and more specifically by a TIF district

that was created to cover 20 acres around the station for 30 years. A portion of the collected tax increment revenue will be used to repay the original capital investment while another one will be used as leverage for future development.

More precisely, it is estimated that $145,6m of the TIF revenue will be directed to TIFIA (Transportation Infrastructure Finance and Innovation Act), while the rest $155m will be used by RRIF (Railroad Rehabilitation and Improvement Financing). This financing structure is unique as it is the first time that the Department of Transport (DoT) has combined the two aforementioned financing programs for just one project. The station is planned to open for public in July 2014 and all transport interventions are estimated to be completed until 2020 (Fig. 4) [26], [27].

- Atlanta Beltline Project, Georgia, USA

Under the objective of relieving the intense problem of traffic congestion and increasing the quality of life of its citizens, Atlanta’s Council approved in 2005 a project of $2,8b and of about 6,500 acres that includes a wide rail transit network, creation of urban green spaces and community housing. More than 50% of the project’s financing ($1,7b) is estimated to be collected through value capture by the creation of a TAD (Tax Allocation District) for 25 years (starting in 2005). It is a TIF application; in Atlanta region the two terms are used interchangeably. TAD boundaries were set so as the majority of included properties are abandoned or misused industrial buildings and not residential. Atlanta Beltline Project is a great example of how value capture mechanisms can be used for financing a noteworthy part of the costs of a major transportation project (Fig. 5) [26], [29], [30].

- Fig. 4. Denver Union Station – Construction phase and future image [28]

- Fig. 5. Beltline’s TAD, map of the area and future development [28]
• Washington DC Metro expansion to Dulles Airport, Virginia, USA

One the largest transportation projects still in progress in the USA that is partly financed through value capture is the 37km expansion of Washington’s Metrorail system to Dulles airport, with a total estimated cost of $5.2b, in two phases. Dulles Corridor area includes, except from the airport, Virginia’s biggest commercial and business centre, Tysons Corner. Phase one of the new line which is going to be called the “Silver line” is expected to finish in 2014, followed by the kick-start of the second phase.

Dulles Rail Transit Improvement District was created, within the limits of which property owners are charged a special assessment. This district is planned to be extended during phase two of the project. Estimations for the revenue collected through the special assessment during phase one show $400m (nearly 15% of total costs) and the revenue will become higher during phase two, reaching the amount of $747m (Fig. 6) [26], [15], [31].

Fig. 6. Dulles Rail Transit Improvement District and Dulles Metrorail Map [15], [31]

• Portland’s Cascade Station and Light Rail to PDX airport, Oregon, USA

This is the only one of the case studies included in this paper that is already completed over 10 years ago, but is it a particularly interesting example due to the fact that a combination of value capture tools was used covering part of its construction costs: joint development and TIF. It is worth mentioning that Portland Max Red Line was completed 10 years prior to the expected date, because of the innovative financial program that was used.

Back in 1997, the project was struggling to survive due to financial difficulties and lack of resources. It was at that crucial point when a private developer, Bechtel Enterprises, suggested to Portland’s Council and Transportation Authority to cooperatively finance the project. Two years of negotiations followed, which reached to the launch of a $125m joint development program. Bechtl’s contribution in the financing was $28.2m, and as return it was given the right to develop 120 acres around Cascade station for 85 years, without the obligation of paying rent to the city.

Moreover, Cascade station is located in the boundaries of the “Airport Way Urban Renewal Area” which functions as a TIF area. This area was designed and is in use from 1986; therefore the collected revenue was used by Portland’s Council for financing the project. The line was given to public in 2001, and although the projections for new jobs and economic development in the area have not been fully realized, the project is still considered very successful for the city of Portland (Fig. 7) [32].

Fig. 7. Cascade station [28], [33], [34]

• London Crossrail Project, UK

Crossrail is a new project that will develop a high frequency rail corridor across London. Once completed in 2018-19, the link is expected to add 10% to London rail capacity. By 2026, Crossrail is presumed to generate £1.24b annually for the London economy. The expected cost of the whole project is £14.8b, £4.1b of which will be covered by the Greater London Authority (GLA) through the Business Rate Supplement (BRS) a fiscal method based on the concept of land value finance (betterment tax).

The BRS will be applied to all 32 London Boroughs and the Common Council of the City of London and is implemented on all non-domestic properties with a rateable value above £55,000. The BRS rate is 2%, flat for all properties liable to it. It was introduced in 2010 with a chargeable period of 24 to 31 years. Over the expected lifetime of the Crossrail BRS, it is estimated that the total revenue from it will be £8,094b (Fig. 8) [35].

It is worth mentioning that a research conducted by [36] criticized the current GLA’s BRS scheme for the flat tax used and proposed an alternative financing strategy with the use of tiered, distance – based taxation both on non – domestic, and residential properties which, according to the authors, has proved to be financially viable, even more efficient than the existing one in terms of incorporated equity etc.

Fig. 8. Crossrail Project in London [36]
IV. SELECTION AND IMPLEMENTATION OF VCF TOOLS: POLICY OUTLOOK

Obviously, there is no indisputably “best” way of successfully selecting and implementing a value capture mechanism. Socio-economic conditions, local differentiations as well as timing have a key role in the final decision. Generally, all the approaches that are based on the concept of value capture could be applied successfully only providing that they will be comprehended and accepted by the citizens. This acceptance requires healthy, fair and transparent administration and public participation in critical decision making. Furthermore, local authorities should set clear objectives about the policy they intend to follow; whether they want to focus on a specific investment’s cost recovery or use value capture in a wider framework of urban redevelopment strategies aiming to support the recovery of the economy towards the principles of sustainable development [37].

According to [4], value capture programs should be structured so as not to impede TOD; the taxes ought not to be very high and it is probably preferable to postpone tax collection for a few years, to allow for a clearly perceived increase in accessibility and thus, values. The same research proposes the following eight criteria in order to evaluate the effectiveness of a value capture mechanism: potential revenue, predictability and stability, horizontal and vertical equity, travel impacts, strategic development objectives, public acceptance, ease of implementation and legal status.

Another research conducted by [25], suggests that public acceptance of a VCF tool is more likely to take place when clear and detailed explanation concerning the necessity of its implementation is provided by the authority(ies) responsible for its introduction and also when the special taxation for the financing of a particular infrastructure is combined with reductions in overall taxation.

A stepwise approach is considered by [6] as an effective way to support decision makers who try to make the best choice of value capture mechanism. This approach includes: focusing on ways to increase accessibility when making a transportation investment, existence of a supporting planning and fiscal urban framework, multi-sector stakeholder involvement and commitment to common targets and continuous monitoring in short-term and long-term basis.

Ten key success factors for the use of value capture methods are identified by [27], the most important of which are:

- Creation of a robust “shared vision” which all stakeholders would be willing to support and promote, setting trust as its underpinning basic value.
- Existence of a long-term plan and a stable governance framework; ensure cohesion and consistency in the program’s leadership regardless potential changes in political scene.

- Smart selection of the implementation area in order to eliminate obstacles by plan’s opponents.

Fig. 9. Project cycle and Value Capture Opportunities [19]

An overall idea about the steps that should be followed when considering the implementation of a value capture strategy can be drawn by the diagram of Fig. 9.

V. CONCLUSIONS AND PERSPECTIVES

The complexity of modern urban needs and the limited availability of financial resources, have led transportation authorities’ worldwide to think creatively, and examine alternative financing schemes. Value Capture Finance emerges as a robust solution for transportation investments, but only in case their application is careful and adapted to the needs of each region, as local circumstances have an important role in the success (or not) of a VCF program. Other factors that have proven to be significant are the existence of a supporting and enabling legal and urban framework and the engagement of all involved stakeholders. The case studies’ analysis has shown that some of the most ambitious and large-scale transportation projects currently (2014) under construction in the US and UK are partially financed through a value capture program. The research is planned to continue with the examination of the ways by which a financing strategy based on value capture finance can be adapted and sustainably implemented to the Greek environment.

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