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Social and economic appraisal of sport facility investments – opportunities in cost-benefit analysis

Thesis Booklet

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1. Background

Cities have competed vigorously for the right to host mega-sporting events in recent decades, however, it seems difficult to explain in economic terms this intense competition (Barclay 2009). Similarly, the construction and operation of sport facilities requires a huge capital investment as well as meaning a huge challenge of financial sustainability (Siegfried – Zimbalist 2000). The characteristic feature of sporting events and sport facilities the separate appearance of costs and expected benefits in time and space. While the most expenses incur at a certain time in the short run usually relating to a specific area, the majority of benefits arise dispersed in the long run.

Despite the need for enormous capital investment and the low volume of potential financial revenues, a vast number of sport facilities are built with public funding. Public subsidies might be justified on the basis of public consumption externalities that cannot be directly captured in monetary transactions and difficult to quantify. Sporting events and sporting activity do not only have economic impacts, they can contribute to the creation of social and human capital as well (Nicholson – Hoye 2008). As a consequence of far-reaching impacts sports related assessments require a complex approach. Externalities affecting the society and the presence of public funding give a special importance to social and financial evaluation of sport facilities.

The focus of the thesis is the investigation of social and economic impacts of sport facilities, however, impacts relating to sporting events and sporting activity are discussed too regarding the strong connection with sport infrastructure. The relevance of the chosen topic is supported by different arguments. First, there is an intense debate in literature whether public subsidy on sport facility investments can be justified by externalities provided by sports. Second, the unexploited development opportunities offered by the potential increase of physical activity of the society might be of great significance for Hungary and Central and Eastern Europe due to the unfavourable health status in the region. Third, with social and economic development sports can be given an increasing emphasis among the determinants of economic actors' decision-making in terms of general well-being, consumption, production and choosing location.

2. Structure of the thesis and the applied methodology

The main objective of the research is to contribute to the literature examining sport facilities, however, there is a duality in the concerned fields of science. On the one hand, the dissertation is related to sports economics with investigating the potential methods to quantify and monetize sports related externalities. In order to do so I have chosen the methodology of cost-benefit analysis as a framework. Therefore, the applied methodology of the research fits in welfare economics as well.

The first part of the thesis aims to systematize sports related social and economic impacts. The developed structure has served as a basis to the creation of an economic framework for the appraisal of sport facilities, that is the main topic of the research. In accordance with it, *Chapter 2* gives a taxonomy of sport related direct and indirect impacts. Research methodology has included qualitative and quantitative instruments as well such as literature review, calculation of correlation, statistical hypothesis testing, cluster analysis, interviews and document analysis. The Chapter is based on the following publications: Vörös (2017a), Vörös – Szörényiné (2019).

Chapter 3 presents a literature review on the methodologies applied in scientific research to evaluate sport facilities, sporting events and sporting activity. As I have identified cost-benefit analysis the most appropriate instrument, *Chapter 4* concentrates on the theoretical examination of cost-benefit analysis based on Vörös (2018a, 2018b). Further developing the findings of Chapter 2-4, I have developed an economic framework for the appraisal of sport facilities which consists of financial and economic cost-benefit analysis, sensitivity analysis and probabilistic risk assessment in *Chapter 5* (Vörös 2017b). The framework is tested by the application on 2 different sport facilities built in 2014 and 2015 in Győr, Hungary. In *Chapter 6* it is applied to evaluate Aqua Sport Centre, while in *Chapter 7* it is tested on Audi Arena. *Chapter 8* compares the results of the two Hungarian sport centres.

3. Hypotheses

The relevance of the chosen topic is supported by the fact that a vast governmental expenditure can be observed in the sector of sports. Siegfried – Zimbalist (2000, 96) gives an estimation of public subsidy spent on sport facilities in case of the United Stated. Bergsgard et al. (2017) analyse public sport financing in four Scandinavian countries – Denmark, Finland, Norway and Sweden. In case of Hungary Géczi – Bardóczy (2017) gives an estimation of public spending on sport infrastructure. The presence of public finance supports the importance of sport facility investments' appraisal from a social point of view.

I have found unanimity in the international literature on supporting the application of cost-benefit analysis for evaluating sporting events (Taks et al. 2011, Barget – Gouguet 2010, Késenne 2005, 2012). However, I have not found general agreement on the appropriate methodology applied to sport facilities. These facts and the strong connection between sporting events and sport facilities have contributed to my first hypothesis:

H1. The methodology of economic (social) cost-benefit analysis is an appropriate instrument for the evaluation of sport facility investments.

Applying cost-benefit analysis in the field of sport has required to extend my research to the examination of the theoretical background of cost-benefit analysis. Among many others I have investigated the following relating topics: the problem of double-counting benefits, the uncertainty of estimations, the appropriate social discount rate, marginal cost of public funds or the role of CBA in practical decision-making. Besides the theoretical analysis, I have examined the application of CBA in the Hungarian practice suggesting my second hypothesis:

H2. The correction of the practical application of cost-benefit analysis in Hungary can contribute to better understand the impacts of different development alternatives and to finetune the results of the analysis.

The presence of public finance raises the question whether public subsidies can be justified on economic terms. The literature on the economics of public sector identifies market failures as the reason for governmental intervention (Stiglitz 2000, 27). One of the solutions for market failures is common goods. That is, governmental intervention can be justified in case of certain goods or services that are desirable for the society, but the socially optimal quantity is not produced by the market. This definition has driven my third hypothesis:

H3. The lack of financial return and the presence of sport related externalities can make governmental subsidy on sport facilities justified. The economic framework for the appraisal of sport facilities can contribute to the examination of the problem with quantitative results.

The analysis of sport facility related social and economic impacts include direct economic impacts – such as the impact of sporting events on tourism – and externalities that cannot be directly captured in monetary transactions – such as the effect of sporting activity on health. An important characteristic of these impacts are their determinants in time and space, as economic actors experience them in time and space. Therefore, the fourth hypothesis states the following:

H4. Spatial allocation of sport facilities do influence the volume of externalities coming from sport.

4. Evaluation of hypotheses

H1. The methodology of economic (social) cost-benefit analysis is an appropriate instrument for the evaluation of sport facility investments.

This hypothesis relates to the applicability of cost-benefit analysis to sport facility investments. Based on the results of Chapter 2 that systematized sport related social and economic impacts, I have conducted a literature review on the applied methodological approaches used to evaluate sport facilities, sporting-events and sporting activity in Chapter 3. Based on the results I have concluded that there is an unanimity on the application of cost-benefit analysis to assess sporting events in the international literature (Barget – Gouguet 2007, 2010, De Nooij 2014a, 2014b, De Nooij et al. 2011, Késenne 2005, 2012, Taks et al. 2011). I have examined the possible applications of CBA in the sector of sport and I have not found any example for applying it to sport facilities. Therefore, as sporting events and sport facilities have much in common, I have adopted the methodology of CBA to sport facility investments. This decision is supported by the specific features of CBA that is the suitability to financial and social evaluations and to monetize externalities as well.

Based on the general examination of the theory of cost-benefit analysis in Chapter 4, Chapter 5 presents the economic framework I have elaborated for the analysis of sport facilities including financial and social cost-benefit analyses. I have tested its practical applicability via two case studies. I have conducted the CBA of two recently build sport arena, the Aqua Sport Centre and the Audi Arena (Győr, Hungary). The analyses are completed with sensitivity analysis and probabilistic risk assessment. The results have justified the suitability of the elaborated framework for the analysis of sport facility investments. The methodology can contribute to the financial and social assessment of sport infrastructure. Its novelty lies in the opportunity of comparing different development alternatives offering a practical tool for decision-making. I have accepted H1 and formulated the following thesis.

T1. The elaborated economic framework based on the methodology of cost-benefit analysis can contribute to examine and measure the financial and social return of sport facility investments with a special emphasis on quantifying sport related externalities.

H2. The correction of the practical application of cost-benefit analysis in Hungary can contribute to better understand the impacts of different development alternatives and to finetune the results of the analysis.

Applying cost-benefit analysis in the field of sport has required to extend my research to the theoretical examination of cost-benefit analysis. The research has covered the following topics: the problem of measurability, the problem of double-counting benefits, applying multiplier effect in CBA, the applicability of willingness-to-pay and willingness-to-accept, the uncertainty of estimations ("optimism bias"), the principle of equity, determining fiscal corrections, the appropriate social discount rate, marginal cost of public funds or the role of CBA in practical decision-making.

Besides the general examination of theoretical issues, I have made two specific proposals for the application of CBA in the Hungarian practice. I have pointed out (1) the inadequate use of multiplier effect in the Hungarian practice of CBA and (2) calculated a value for the factor of fiscal corrections based on the Hungarian tax system.

1) I have identified the inappropriate use of multiplier effect in CBA among benefits due to several reasons. Practical applications did not calculate multiplier effect in the "alternative cases". However, all spending do exert their multiplier effect, irrespective of the sector it is spent on. If it would be appropriate to use multiplier effect in CBA at all, one must consider only the surplus multiplier effect compared to the alternative projects according to the following. The analysis should be aware of double-counting, the possibility of just reallocating resources and treat the elements that increase GDP but decrease welfare or vice versa. None of the analysed practical applications included the mentioned principles.

Based on the theoretical research and the document analysis of practical applications I have concluded that the use of multiplier effects as a benefit observed in the Hungarian practice of cost-benefit cannot be regarded as an economically adequate instrument. Consequently, the way in which multipliers are used in practice in Hungary is an inappropriate tool for the quantification of the effects emerging in secondary markets (wider economic benefits). This finding is affirmed by the fact that, reviewing the European practice, I have not found a single country that has incorporated this approach into its application of CBA (Vörös et al. 2016, 117).

2) My other research has examined the following rule on fiscal corrections of the Hungarian CBA guidebook: "the economic analysis should not include indirect taxes" (Trenecon 2016, 43). According to my view, the logic of fiscal correction should not be based on the direct or indirect nature of the tax item. Based on the theory of cost-benefit analysis, the adequate guiding

principle should be whether a specific financial item spent on the project can be considered as a sunk cost from a social point of view. Of course, the value-added tax does not belong to this category, as it is a source of public revenue. Applying the principles above to the Hungarian tax regime, from the total cost of the labour force's employment, the personal income tax and the social contribution tax cannot be considered social costs. Whereas, besides the net wage, pension insurance contribution, health insurance contribution, labour market contribution and vocational training contribution can be considered social costs as these items can be interpreted as the deferred salary or consumption of the employee.

Based on the Hungarian tax regime in effect on 1 January 2018, the fiscal correction factor of labour costs is 0.2851, which measures the share of those personnel expenses within the total wage and contribution bill that are classified as social costs. In other words, 28.51 percent of the wage and contribution bill need to be deducted in cost-benefit analysis when converting financial costs.

The results can contribute to the development of the practice of cost-benefit analysis in Hungary. I have formulated Thesis 2 as follows.

T2. The correction of the practical application of cost-benefit analysis in Hungary can contribute to better understand the impacts of different development alternatives and to finetune the results of the analysis.

T2a. The way in which multipliers are used in practice in Hungary is an economically inappropriate tool for the quantification of the effects appearing in the secondary markets.

T2b. The way in which financial costs are converted to economic costs, as the base of fiscal correction is the difference between direct and indirect taxes, is not appropriate in economic (social) cost-benefit analysis. The adequate guiding principle is whether a specific financial item spent on the project can be considered as a sunk cost from a social point of view.

H3. The lack of financial return and the presence of sport related externalities can make governmental subsidy on sport facilities justified. The economic framework for the appraisal of sport facilities can contribute to the examination of the problem with quantitative results.

I have elaborated an economic framework for the assessment of sport facility investments that is presented in Chapter 5. I have tested the methodology on two different recently built sport halls, the Aqua Sport Centre and the Audi Arena. The ex post financial and social cost-benefit analyses were completed with sensitivity analyses and probabilistic risk assessments. I have been given real data about the investment costs and the operation costs, as well as the number of users in both cases by the operator company.

The indicators produced by the analyses render quantitative information on financial and social return of the examined infrastructure projects and give monetary values to related externalities stemming from sport. The financial analysis applies the financial net present value (FNPV), the financial internal rate of return (FIRR) and the cost recovery rate. According to the values of these indicators both analysed projects have negative net present value. The internal rate of return cannot be calculated in case of the Aqua Sport Centre, as none of the years in the examined period has a positive cash flow. Its cost recovery ratio is less than 100%. The FIRR of Audi Arena proved to be negative. However, its revenues exceed the operating costs during, the surplus does not cover a return for the investment costs. The results have not justified financial return in any cases.

The social CBA has attempted to capture 4 externalities (1. savings on health care due to increased physical activity, 2. individual welfare gains from increased physical activity, 3. productivity gains from increased physical activity, 4. economic benefits from sporting events) besides the correction of financial costs and revenues. Social return was measured by 3 indicators: the economic net present value (ENPV), the economic internal rate of return (EIRR) and the benefit-cost ratio (BCR). Both projects resulted a positive ENPV, the EIRR exceeded the applied social discount rate and the BCR indicators were greater than 1. Therefore, both projects proved to be effective from a social point of view under the applied assumptions. I have accepted H3 and formulated the following thesis.

T3. The lack of financial return and the presence of sport related externalities can make governmental subsidy on sport facilities justified. The economic framework for the appraisal of sport facilities can contribute to the examination of the problem with quantitative results.

H4. Spatial allocation of sport facilities do influence the volume of externalities coming from sport.

Chapter 1.1.4 shed light on the spatial aspects of sports in the introduction, pointing out the role of sports in economic actors' decision-making processes concerning consumption, production or choosing location. In Chapter 2 I have examined the social and economic mechanisms of sports emphasising spatial aspects in several contexts:

- Chapter 2.3 examines the embeddedness of sports in society via a cluster analysis and statistical hypothesis testing of the data on the European Union. The analysed variables – the average yearly expenditure on recreational and sporting services of households, the proportion of the physically active population and the proportion of population engaging in voluntary work that supports sporting activities - showed the spatial separation of the examined countries. Clusters showed statistically significant difference according to several attributes (GDP per capita, Human Development Index, expected healthy life years at birth, self-perceived health status, mental health).
- Chapter 2.4 analyses the change in physical activity in European countries, with a special emphasis on Central and Eastern European countries – Poland, the Czech Republic, Slovakia, Hungary, Romania and Bulgaria. The analysis pointed out the common political and historical legacy as a reason of the low physical activity in the region.
- Chapter 2.5 examines the role of sport in accumulating social capital. I have presented two case studies pointing out the relevance of sport facilities' location in space. One of the case studies has investigated the spatial location of a swimming-pool (Aqua Sport Centre, Győr). The other one has examined the activity of a non-profit organization (Bagázs Egyesület) aiming to integrate Roma population into society with the help of sport. The conclusion has emphasised the importance of cooperation between cities and rural areas to exploit the opportunities of sports through the adequate location and operation of sport facilities.

I have analysed the potential methods of approach to evaluate sport facility investments in Chapter 3.1. The international literature review included the examination of the relationship between the spatial availability of sport facilities and the level of physical activity in the society. I have identified positive relationship in the literature (Halonen 2015, Hallmann et al. 2012, Guo et al. 2015, Roult et al. 2013 és Wicker et al. 2009, 2013) with one exception (Kokolakakis

et al. 2014). The results of Davies (2016) research have turned my attention to the important role of the way sport facilities are used in the creation of social impacts.

I have presented an economic framework for the assessment of sport facilities in Chapter 5 monetizing five different sources of social benefits. The volume of the benefits do depend on the spatial allocation of the infrastructure in all five cases. The availability in time and space influences the volume of three elements of the total benefits for the society – savings on health care due to increased physical activity, individual welfare gains from increased physical activity, productivity gains from increased physical activity – through the number of individuals engaged in sporting activities in the facility. The reason for this is that, the individuals using the facility make their decisions on consumption or choosing residence and workplace in time and space. The set of potential decision alternatives are structured by a budget and a time constraint as well. Chapter 2.5.3 points out the role of sport facilities' spatial availability in the creation of social benefits originating from sports. The sensitivity analysis of the Aqua Sport Centre has emphasized the key role of the number of individuals using the swimming-pool in the creation of social benefits too.

The availability in time and space influences the volume of the rest of the elements of the total benefits for the society – savings on health care due to increased physical activity, individual welfare gains from – financial revenues after fiscal corrections, economic benefits from sporting events – through the number of visitors arriving outside of the examined region. The reason for this is similarly the presence of a time constraint besides a budget constraint influencing decision making in space. The sensitivity analysis of Audi Arena has emphasised the key role of the number of people visiting sporting and cultural events in the facility.

Based on my research I have accepted H! and formulated the following thesis:

T4. The spatial allocation of sport facilities do influence the volume of sport related externalities. However, the presence of the infrastructure is a necessary but not a sufficient condition for the realization of sport related externalities.

5. Novel results

- Quantitative analysis of the social aspects of sport in the European Union
- The examination of the potential role of sports in the creation of social capital
- Comparative analysis of national sport policy documents
- Spatial interpretation of sport facility related social impacts in terms of the relation between cities and rural areas
- The taxonomy of social and economic impacts relating to sport facilities, sporting events and sporting activity
- The systematisation of methodological approaches to evaluate sport facilities, sporting events and sporting activity based on international literature review
- Analysing the methodological problems of cost-benefit analysis
- A proposal to develop the application of the methodology of cost-benefit analysis in the Hungarian practice
- The elaboration of an economic framework for the cost-benefit analysis of sport facility investments
- The financial and economic (social) cost-benefit analysis of the Aqua Sport Centre (Győr, Hungary)
- The financial and economic (social) cost-benefit analysis of the Audi Arena (Győr, Hungary)
- The application of sensitivity analysis and probabilistic risk assessment in case of sport facilities

6. Publications and conference presentations

Publications

Vörös Tünde, Szörényiné Kukorelli Irén (2019): A sport lehetséges szerepe a társadalmi tőke létrehozásában. *Tér Gazdaság Ember,* under publication

Vörös Tünde (2018a): Methodological Challenges in Cost-Benefit Analysis. *Public Finance Quarterly,* 3. 402-423.

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Vörös Tünde (2017): A sportolási hajlandóság növelésében rejlő lehetőségek Kelet-Közép-Európa társadalmi-gazdasági fejlődése tükrében. *Tér és Társadalom*, 2. 83-103.

Vörös Tünde (2017): Költség-haszon elemzési keretrendszer sportberuházások társadalmi-gazdasági értékeléséhez. *Közgazdasági Szemle,* 4. 394-420.

Vörös Tünde (2017): Ösztönző szabályozás a versenyrendszerek kialakításában – a kifizetési struktúra hatása a sportteljesítményre. *Magyar Sporttudományi Szemle,* 18. 23-36.

Juhász Mattias, Vörös Tünde, Mátrai Tamás, Halmos Tamás, Tóth Patrik (2017): The Progress of Implementing SUMP in Budapest: Project Selection, Monitoring & Evaluation and the Role of Macroscopic Transport Modelling. *Association for European Transport,* Henley-in-Arden, Paper 5481. 1-14.

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Vörös Tünde (2015): Kihívások Budapest közösségi közlekedésében. Ercsey Ida, Szegedi Zoltán (szerk.) *Fenntartható fejlődés és innováció: Esettanulmányok objektív és szubjektív megközelítésben*. Universitas-Győr Nonprofit Kft., Győr. 30-42.

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Juhász Mattias, Princz-Jakovics Tibor, Vörös Tünde (2013): What are the real effects of railway electrification in Hungary? *Association for European Transport,* Henley-in-Arden, pp.1-14.

Vörös Tünde (2012): A látvány-csapatsportok támogatásával összefüggő társasági adó törvénymódosítás lehetséges társadalmi-gazdasági hatásai. *Magyar Sporttudományi Szemle*, 51. 36-40.

Conference presentations

Vörös Tünde, Koppány Krisztián, Kovács Norbert, Gyömörei Tamás (2018): A győri Audi Aréna multifunkcionális csarnok társadalmi-gazdasági hatásai. *Kautz Gyula Konferencia: Kulturális gazdaság*, Győr, Széchenyi István Egyetem, 2018.06.05.

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Vörös Tünde (2017): A győri Aqua Sportközpont beruházás pénzügyi és társadalmi elemzése: érzékenységvizsgálat és kvantitatív kockázatelemzés. *Kautz Gyula Konferencia: Sport – gazdaság – turizmus,* Győr, Széchenyi István Egyetem, 2017.06.08.

Vörös Tünde (2017): Sportberuházások pénzügyi és közgazdasági érzékenységvizsgálata: kockázatok egy sportlétesítmény életében. *Nyerges Mihály Konferencia, Eredményjelző: Magyar sport 2016,* Budapest, Testnevelési Egyetem, 2017.01.26.

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Vörös Tünde, Juhász Mattias, Koppány Krisztián (2015): The measurement of indirect effects in project appraisal. *European Transport Conference,* Frankfurt am Main, 2015.09.28-30.

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Vörös Tünde (2013): A sportoló lakosság arányát befolyásoló változók meghatározása, számszerűsítése és elemzése európai országok vonatkozásában. *XVIII. Bolyai Konferencia,* Budapest, 2013.03.23-24.

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