

## Evaluation of the Economic Impact of Higher Educational Institutions on the National Economy

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### ***Abstract***<sup>1</sup>

*The article gives an insight in the economic impact of a higher educational institution (Riga Technical University, Latvia) on the national economy. The role of universities is changing through decades and the number of ways to evaluate university impact increases. Today, tools for the evaluation of higher educational institutions are mainly related to typology and rankings. This research is devoted to finding out the possible ways for calculation which allows to evaluate the added value of higher education and science in the national economy. Results were achieved by choosing a methodology for the evaluation of higher educational institution impact on the national economy. Calculations were made on the example of Riga Technical University and new ways of adjustment of the calculations and the methodology were discovered. The authors concluded that in 2019 one euro invested in Riga Technical University returned to the national economy in the amount of 10.8 euros.*

***Keywords: evaluation of university impact, national economy, methodology***

### **1. Introduction**

The article covers the topical question on higher educational institution (hereafter – HEI) evaluation possibilities, it includes an insight in the classification of HEIs, evaluation methods and possibilities of calculating the national impact.

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This article is important to all HEIs who would like to understand and calculate their impact on the national economy. Within this article an insight in the calculations for Riga Technical University, Latvia (hereafter – RTU) is given. The main conclusion is that in 2019 one euro invested in Riga Technical University returned to the national economy in the amount of 10.8 euros. The research is based on literature review, application of the expert method and statistical data processing. After finishing the research, the authors noticed the areas of improvement for further studies.

## 2. Aim and Methodology

There are always debates about the role of HEIs in the society. No doubts, HEIs have social and economic roles, they are economic and political forces. Also it should be mentioned that the European policy agendas are changing (Ozolins M. et.al., 2018). As said in the **Observatory of the European University** (hereafter – OEU) Methodological Guide: “They are usually important employers in their region and are stakeholders for urban planning and public transport. Universities are also providers of services”. (Observatory of the European University, 2006). There are various classifications of higher educational institutions; the principles of classification are based on national particularities. Among different approaches, the most well-known are the Carnegie classification (developed for the first time in 1973), the UK approach, different EU methodologies described in Eurydice (Eurydice, 2021). About the Carnegie classification Borden writes: “The Basic Classification was originally published for public use in 1973, and subsequently updated in 1976, 1987, 1994, 2000, 2005, 2010, 2015, 2018 and 2021. The 2021 update includes only minor changes.” (Borden V., 2021) According to the Carnegie classification, there are Doctoral Universities, Master’s Colleges and Universities, Baccalaureate Colleges, Baccalaureate/Associate’s Colleges, Associate’s Colleges, Special Focus Institutions, and Tribal Colleges (Borden V., 2021). For the European market in 2006 (Eurydice, 2021), a new – multiple dimensional classification was

created for the classification of HEIs. For the European HEI classification several principles are applicable – this classification is inclusive for all European higher education institutions, it works as a tool for developing institutional profiles, it is multi-dimensional and flexible, not prescriptive or rigid, ownership to rest with higher education institutions (van Vught, 2006).

The methodology for the calculation of HEI impact on the national economy is applicable to any type of HEI, but the example given in this article was calculated on the basis of Riga Technical University which according to the Carnegie classification is a doctoral university but according to the EU classification – a research university.

The **research object** is Riga Technical University. The **subject** of this research is the evaluation of the economic impact of higher educational institutions on the national economy. The **aim** is to find the best method or methodology for the evaluation of the economic impact of HEIs on the national economy and calculating the annual impact.

The **methodological background** of the research was based on systematic literature review/overview, analysis of existing methodologies for evaluation of the HEI impact on the national economy, the expert method, analysis of statistical and macroeconomic data from different sources, including unpublished information of the University (in this case – Riga Technical University).

### **3. Different approaches to evaluate HEIs and their role in national economies**

No doubts, HEIs, especially universities, are usually important players in the region they are located. For many years, different researchers from various areas aimed to evaluate the significance of HEIs as well as forecast the future development of HEIs. This role is changing in line with globalization and

digitalization which are the main forces in shifts in the global economy. Out of many studies of scholars who have devoted their scientific interests to altering the paradigm of universities, the authors of this research will mention just a few main trends. **First**, the role of the university depends on **Clark’s triangle**. “In the late 1970s, Clark undertook extensive work to map the different ways in which coordination occurs within academic systems. Clark’s triangle is derived from his identification of three dominant forms of the system: state, market and professional, each of which offers an alternative means of coordination within a larger academic system.” (Maggio Z., 2011). This triangle (see Figure 1) is used in many studies to emphasize the linkage between HEI governance and state authority, though it is also mentioned as a simplified model for understanding the role of universities in the society. At the same time according to Maggio “Clark’s model remains an elegant and appealing framework for comparing national systems, and its relative simplicity lends it a resilient utility that has ensured its relevance for thirty years”.

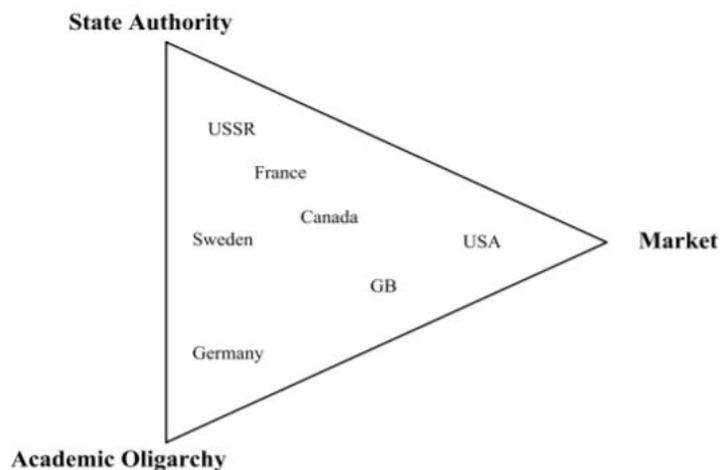


Figure 1. Clark’s coordination triangle – organizational models of HE.  
Source: Based on Clark (1983). Used with permission from University of California Press.

**Figure 1:** Clark’s coordination triangle (from Dobbins M., 2011)

It is obvious that one of trends is to observe change in coordination of universities – changes of governance models are happening all around the globe.

**Secondly**, the role, and even more the success of HEIs, depends on the **level of university and industry cooperation**. Many articles and studies have been published about university and industry cooperation. Among them – the idea about and around the **university’s third mission**. One of the most prominent authors in this area is J.G. Wissema who has published a book titled “Towards the Third Generation University. Managing the University in Transition” (Wissema, 2009). The university’s third mission encompasses the relations between a university and its nonacademic partners. It supersedes the sole transfer of knowledge towards economic actors (patents, licenses, spin-offs etc.). The complexity of this issue reflects the richness of the bounds linking the university to the society at large (OEU Methodological Guide, 2006). The third mission should take into consideration the following aspects (OEU Methodological Guide, 2006):

- The transfer of “competences trained through research” to industry.
- The ownership of knowledge (patents, copyright etc.), the use of it (university’s spin-offs) and the contracts with industry and public bodies.
- The participation of academics in policy making, including advisory boards.

The university’s third mission emphasizes its economic role and underlines the importance of the HEI in the regional context. The third mission can be well tied together with university governance and state authority as it was described by Clark’s triangle. In the context of today’s global and digital changes it is obvious that the third mission strengthens increasing competition for talent development – specialists skilled in theoretical and practical areas, including research. Nowadays, organizations are trying to have, not only a competitive advantage in the market, but also in sustainable development (Medne, A., Lapiņa, I., 2019).

This leads us to the **third main trend – triple helix elements** – in a HEI as a creator of the regional business ecosystem. Triple Helix was developed in the 1990s by Henry Etzkowitz and Loet Leydesdorf (Etzkowitz, 2008). This model usually is used by institutions with the aim to stress the innovative approach of the organizations in cooperation with all stakeholders that are important for the HEI. Within this model the role of HEIs increases, especially in the regional innovation ecosystems.

Besides previously mentioned different possibilities of mapping universities, it is very common to use a wide range of ranking systems. Ranking is well tied up with classification, typology, mission, and other parameters of HEIs, it is broadly used and reflected. Basically, typology is a tool that groups HEIs according to selected characteristics. This means HEIs are better or worse. The two most common horizontal typologies are the Carnegie classification, designed for the United States, and the U-Map, developed with the support of the European Commission, which were described previously. At the same time rankings are a very powerful tool today, first used in the United States at the beginning of the 20th century. In the last decades there has been a major expansion of ranking systems globally and now it is a way to measure the success of the HEI, just by application of ranking. Usually, the purpose of ranking is to measure the performance of an institution and provide all stakeholders with information on which institutions offer the best quality. No doubts, this is a system which allows to compare and evaluate but – is this system comprehensive enough? Do rankings provide an objective overview?

According to the authors' opinion, there are two types of rankings. The first sums up the activities of an institution into one figure and compiles a kind of a league table (the best-known rankings of this type are ARWU, QS, Taiwan Ranking and THE). The second type of the ranking system is based on a multidimensional approach (one example is the emerging U-Multirank). As we can see from Clark's Triangle – there are different dominant systems which form HEIs and create an unequal basis as a starting point, especially from the financial standpoint, which could be mainly

attributed to small and emerging economies. This unequal evaluation leads researchers to the main question – what is the return on investments in HEIs?

Only from the few mentioned facts it is obvious that the regional role of HEIs is increasing, so it seems up-to-date to find the best method or methodology for the evaluation of the economic impact of HEIs on the national economy.

#### **4. Methods for evaluation of the economic impact of HEIs on the national economy**

There is a wide range of methods for assessing investments in the national economy, but there are not so many methods for assessing investments in HEIs and their impact on the national economy. It is well known that HEIs have different functions. For example, Buzas N. and Lukovics M. in their research mentioned new functions in the engaged university model – knowledge transfer, policy development, economic initiatives (Buzas, Lukovics, 2014). But, besides mentioned functions, one of the most significant functions is national development, which forms the basis for national growth. HEIs also develop talents and directly add value to the national economy. It is mentioned in many reserches that the university takes responsibility for the quality of all activities (Medne, A. et.al, 2020). Besides that, the autonomy of universities and their academic freedom influenced by the situation in the national economy and the international environment support innovation and valorization which again directly cause an impact on the national economy.

Methods for the evaluation of the impact of HEIs on the national economy can be divided into three main groups – direct, indirect, and mixed, which goes hand in hand with modelling by the application of static or dynamic mathematical models to the calculation. Among direct methods, the most popular methods are ACE, simplified ACE where impacts are estimated from information with an ample level of detail and directly coming from surveying the principal agents. Among indirect methods – Ryan Short Cut, I-O Analysis (e.g. IMPLAN, RIMS-II) and The

Keynesian Local Multiplier model which usually use secondary information to estimate, in an indirect way, the impacts upon the local economy (Yserte and Gallo-Rivera 2010). In the mixed method group such methods as Computable General Equilibrium (CGE) Models, Social Accounting Matrix (SAM) Models, dynamic models (e.g. REMI) etc. can be mentioned.

This is always a difficult task to choose the right method, therefore a group of experts after analysis of different parameters came to a conclusion about the parameters/criteria according to which the method should be selected, namely:

- availability of the source/input data,
- reliability of the source/input data,
- scope,
- regular updates of the source/input data,
- simplicity and understandability,
- cost effectiveness,
- implementability with internal resources,
- easy repeatability,
- penetration.

Methods were compared according to these criteria, and the most appropriate method for the calculation of university impact on the national economy was the method “The Economic Impact of University of British Columbia” developed by Walter Sudmant and published in 2009 (Sudmant, 2009). **The idea behind the Sudmant methodology is the following (Sudmant, 2009)”:**

- Any public expenditure generates an economic impact simply by virtue of the spending in the local economy,
- In the field of Regional Economics economic impact is defined as the prediction or explanation of change to various measures (spending, income, employment) of a local economy after the introduction of a change or new element to the economy,

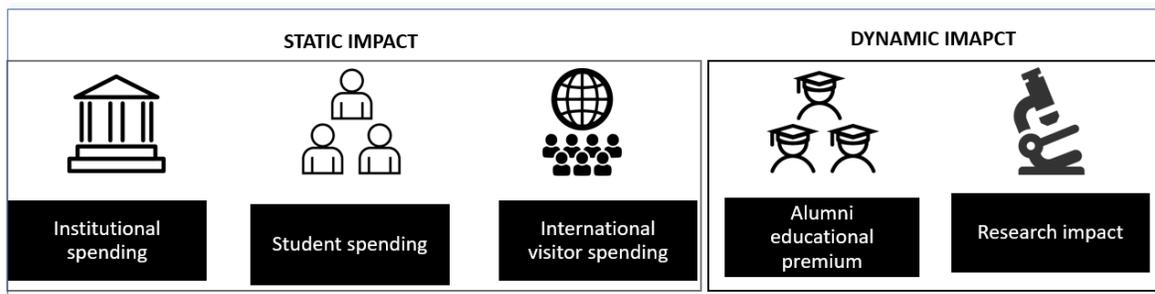
- The sudden impact would be a reduction in the level of economic activity by not just the total spending, but also by a factor relating that spending to the re-spending – i.e., the multiplier.

## **5. Evaluation of the economic impact of a HEI on the national economy.**

### **Example: Riga Technical University, Latvia**

The methodology (adopted from Sudmant, 2009) is based on publicly available statistics and allows to calculate both the static, demand-driven impact (expenditure) of the University and dynamic, supply-side effects or investment in increasing the productivity of the national economy through the development of human capital and innovation. To assess the total economic impact of the University, taking into account the financial circulation in the economy, a **multiplier of 1.5 was applied** to the calculation of the direct impact. According to the Sudmant methodology: “A local university, like many other public institutions, can be an important source of local expenditures and local employment, both directly through local hiring and spending, and indirectly from the multiplier effects of the spending and re-spending” (Sudmant, 2009). Therefore, also in calculating the indirect economic impact the multiplier 1.5 was applied as it was suggested by the author of the methodology: “By tracing linkages of expenditure and income through the economy, it is always the case that economic impact studies use a multiplier greater than one” (Sudmant, 2009)”.

For the calculations both static and dynamic economic impacts on the economy were considered (see Figure 2).



**Figure 2:** The Sudmant model includes an assessment of the static and dynamic economic impact on the economy (from Sudmant W., 2009)

- The static impact:
  - Institutional spending includes operations and capital expenditures. The University expenses includes paying for goods, services, foreign business trips, paying salaries to staff, scholarships for students, and capital expenditures. Both direct and indirect impacts are calculated and summarized to get the total impact.
  - Student spending includes daily expenses of all full-time students: local and international. Both direct and indirect impacts on the economy are calculated and summarized to get the total impact.
  - International visitor spending includes expenses of foreign guests visiting the University's staff and international students as well as participating in scientific and business events organized by the University. Both direct and indirect impacts are calculated and summarized to get the total impact.
- The dynamic impact:
  - Alumni educational premium is an increase in the salary received by an employee with a higher level of education compared to an employee with a lower level of education. Calculation includes educational premium of all RTU alumni currently active in the local labor market. Both direct and indirect impacts are calculated and summarized to get the total impact.

- Research impact estimates the impact of the University's research and innovation on the local economy, and it is calculated using the relationship between the University's R&D expenditure and total factor productivity in the country. The estimation is already taken as an indirect impact.

**Facts and figures about RTU.** Riga Technical university was established in 1962, and currently there are about 13 300 students in total, of which 13% are international students, and 4% are PhD students. Currently RTU has more than 140 000 alumni. The University consists of 9 faculties and 4 regional Study and science centers. In total, there are more than 140 study programs, of which 47 are completely taught in English, 1031 academic staff and researchers. Engineering High School (EHS) of Riga Technical University is the first general secondary education establishment in Latvia founded within the framework of a university.

## 6. Calculations

**Institutional Spending.** Institutional spending includes operating expenses and capital expenditure.

Operating expenses – salaries and benefits, expenses for goods and services, scholarships, other operating expenses. Capital expenditure – intangible investments (licenses, patents, computer programs) and fixed assets (land, buildings, major repairs and reconstruction, infrastructure, equipment, household fixed assets, library stocks, computer equipment). The RTU operating and capital expenses paid outside Latvia, as well as expenses for foreign business trips made by RTU staff were not included in the calculation (see Table 1).

**Table 1: Institutional spending (MEUR / 2019)**

Indicator	Spending MEUR
Operating expenses (a)	52.4
Capital expenditure (b)	10.4
<b>Total direct</b> (c=a+b)	<b>62.8</b>
<b>Total spending impact</b> (c*multiplier 1.5)	<b>94.2</b>

**Student Spending.** Student spending was calculated considering three main components (see Table 2): (a) the number of RTU full-time students, (b) the students' monthly expenditure (EUROSTUDENT VI, 2017; Certus, 2016) and (c) the number of academic months in a year. The spending of local (see Table 2) and international students (see Table 3) was calculated separately.

**Table 2: Local students**

Indicator	Full-time undergraduate and master students	PhD students
Number of students (a)	9387	489
Students' monthly expenses* (EUR) (b)	612.51	874.57
Academic months in a year (c)	10	11
Total expenditure in a year (MEUR) ( $d_1=a*b*c$ )	<b>57.5</b>	<b>4.7</b>

And the spending of PhD students was calculated separately as the number of their academic months in a year differs.

Students' monthly expenditure includes expenses for housing, food, communication services, health care, social and entertainment and other regular payments. The tuition fee paid to RTU was not included to avoid double counting. The final calculation is showed in Table 4.

**Table 3: International students**

<b>Indicators</b>	<b>Full-time undergraduate and master students</b>	<b>PhD students</b>
Number of students (a)	1838	37
Students' monthly expenses* (EUR) (b)	772.86	1105.19
Academic months in a year (c)	10	11
Total expenditure in a year (MEUR) ( $d_2=a*b*c$ )	<b>14.2</b>	<b>0.4</b>

**Table 4: Student spending (MEUR / 2019)**

<b>Indicator</b>	<b>Spending /incomes/measures</b>
Total local full-time students' expenses (d1)	62.2
Total international full-time students' expenses (d2)	14.1
RTU expenditure for student scholarships (e)	2.9
RTU income from service hotels (f)	2.4
<b>Total direct</b> ( $g=d_1+d_2-e-f$ )	<b>71.5</b>
<b>Total spending impact</b> ( $g*\text{multiplier } 1.5$ )	<b>107.2</b>

**International Visitor Spending.** Two types of international visitors were distinguished: (1) foreign friends and families visiting the RTU international students; (2) foreign guests visiting RTU staff and/or attending events organized by the University. The following source data were used for calculation (see Table 5): (a) the number of RTU international students; (b) the average number of guests per student annually; (c) the average length of stay (days) (CSB, 2019); (d) spending per day (EUR) (CSB, 2019).

**Table 5: Spending of foreign friends and families visiting RTU international students (MEUR / 2019)**

<b>Indicator</b>	<b>Spending /measures</b>
Number of RTU international students (a)	1875
Average number of guests per student annually (b)	2,8
Average length of stay (days) (c)	4
Spending per day (EUR) (d)	88.5
Total spending (MEUR) ( $e_1=a*b*c*d$ )	<b>1.9</b>

It is also necessary to calculate spending of foreign guests visiting RTU staff and/or attending events organized by the University in Latvia (see Table 6) and total spending of international visitors (see Table 7).

**Table 6: Spending of foreign guests visiting at RTU (MEUR / 2019)**

<b>Indicator</b>	<b>Spending/ measures</b>
Number of RTU full-time staff (a)	2087
Average number of guests per staff member annually (b)	4
Average length of stay (days) (c)	4,3
Spending per day (EUR) (d)	88.5
Total spending (MEUR) ( $e_2=a*b*c*d$ )	<b>3.2</b>

**Alumni Educational Premium.** Studies at the university provide skills and knowledge, develop competencies that increase the competitiveness and productivity of alumni, and, accordingly, the productivity of the companies in which alumni work, the industry and the whole economy.

**Table 7: International visitor spending (MEUR / 2019)**

<b>Indicator</b>	<b>Spending</b>
Spending of foreign friends and families visiting RTU international students (e1)	1.9
Spending of foreign guests visiting at RTU (e2)	3.2
<b>Total direct</b> (f= e1+e2)	<b>5.0</b>
<b>Total spending impact</b> (f*multiplier 1.5)	<b>7.6</b>

Employees with higher education are paid more than employees with a lower level of education. Salary increase is defined as the “alumni premium” and its value is determined by calculating the difference between the average annual income of employees with different levels of education (general secondary education and collage’s degree, bachelor’s degree and master’s degree).

According to the methodology, the calculation included alumni with a college education, bachelor’s, and master’s degree who had graduated from RTU in the last 40 years and were of economically active age (up to 64 years) for the calculation year.

To calculate the wage difference between different levels of education, the data of the Labor Force Survey of the Central Statistical Bureau (2018) were used. The calculations also took into account the pay gap between age groups. The calculation principle is described in Formula 1.

$$d=(a-b)*c \tag{1}$$

where: a – the average annual salary of a university alumnus,

b – the average annual salary of a secondary school alumnus,

c – the number of alumni in the labor market,

d – the Alumni Educational Premium.

**Alumni Educational Premium** of RTU (2019) (see Table 8). In the period from 1979 to 2018, 84,700 students graduated from RTU, of which 74% were employed in the Latvian labor market for the calculation year.

The calculation took into account the alumni with a college education, bachelor's and master's degree, assuming that the premium of doctoral alumni is included in the calculation of the impact of research.

**Table 8: Spending of foreign guests visiting at RTU**

<b>Indicators</b>	<b>Spending/ measures</b>
Number of alumni included in the calculation	62 000
RTU alumni premium (direct)	318.8 MEUR
Total alumni premium impact (multiplier 1.5)	478.2 MEUR

**Table 9: Research Impact (MEUR / 2019)**

<b>Indicators</b>	<b>Spending</b>
Latvia's GDP growth (1991-2019) (MEUR, at 2015 constant prices) <sup>1</sup>	6 843
The contribution of total factor productivity to Latvia's GDP growth 1991-2019 (25%) <sup>2</sup>	1 711
The contribution of Latvian R&D to Latvia's total factor productivity (56%) <sup>3</sup>	961
The share of Latvian higher education sector in Latvian R&D (55%) <sup>4</sup>	531
The share of RTU R&D in R&D of the Latvian higher education sector (30%) <sup>5</sup>	157
<b>Total research impact</b>	<b>157</b>

<sup>1</sup> source: CSB (CSP, 2019);

<sup>2</sup> source: Latvijas Banka (The National Central Bank of Latvia) expert assessment (Latvijas Banka, 2019);

<sup>3</sup> multinational companies are increasingly seen as the main channel for new technologies and innovation between countries. Based on this, the impact of foreign research on total factor productivity is equated to the share of foreign-controlled enterprises in the total turnover of Latvian enterprises, which is 44% (CSB, 2017). The impact of local R&D is 56%, respectively. According to the methodology, in the following calculation, the investment or impact ratio is obtained by calculating the investment ratio;

<sup>4</sup> the proportion of Latvian higher education sector's funding for research work in Latvia's total funding for research work (CSB, 2019);

<sup>5</sup> the proportion of RTU funding for research work in Latvian higher education sector's funding for research work (RTU, 2019).

**Table 10: Impact of RTU on Latvian National Economy in 2019**

<b>Indicators</b>	<b>Total impact (MEUR)</b>
Institutional Spending	94.2
Student Spending	107.2
International Visitor Spending	7.6
Alumni Educational Premium	478.2
Research Impact	156.9
TOTAL RTU impact on Latvian National Economy in 2019	844

## 7. Conclusions

The literature analysis confirmed that there are different approaches to evaluation of the university success in the global market, mainly based on different methods of classification or ranking. It is important to find other methods for getting real and objective evaluation of the HEI performance in a particular market or region, especially if HEIs are a part of a small and emerging economy. This research gave an insight in the possibility of calculating the impact of a HEI – Riga Technical

University on the national economy. Within the research the best method for the evaluation of the economic impact of HEIs on the national economy was found and calculation of the annual impact was presented. Within the research the following conclusions were made:

**Table 11: Impact of RTU on Latvian National Economy in 2015-2019**  
(Total impact, MEUR)

<b>Indicator</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>
<b>Institutional Spending</b>	<b>93.3</b>	<b>63.8</b>	<b>70.6</b>	<b>83.5</b>	<b>94.2</b>
Operating expenses	68.6	62.7	68.3	72.9	81.1
Capital expenditure	26.3	2.5	3.9	12.5	15.6
Expenses for foreign business trips	-1.6	-1.5	-1.7	-1.9	-2.5
<b>Student Spending</b>	<b>91.3</b>	<b>96.2</b>	<b>102.4</b>	<b>101.2</b>	<b>107.2</b>
Local student spending	83.8	85.0	85.2	86.1	86.7
International student spending	7.5	11.2	17.2	15.1	20.5
<b>International Visitor Spending</b>	<b>6.6</b>	<b>6.9</b>	<b>8.1</b>	<b>7.2</b>	<b>7.6</b>
Foreign friends and families visiting RTU international students	1.3	1.6	2.7	2.4	2.8
Foreign guests visiting at RTU	5.3	5.3	5.4	4.8	4.8
<b>Alumni Educational Premium</b>	<b>380.6</b>	<b>388.4</b>	<b>391.4</b>	<b>400.3</b>	<b>478.2</b>
<b>Research impact</b>	<b>60.7</b>	<b>60.2</b>	<b>101.2</b>	<b>112.3</b>	<b>156.9</b>
<b>TOTAL</b>	<b>632</b>	<b>615</b>	<b>674</b>	<b>704</b>	<b>844</b>

- The role of universities is changing through decades,
- Today not only the typology and rankings of universities can be used for the evaluation of the impact of HEIs on the regional economic development and their role in national economies,
- There are several methods for calculating the contribution of HEIs to the national economy,
- To calculate RTU's contribution to the national economy, the authors of this research searched for and analyzed different methods by which world universities have calculated their contribution to the economy, and chose the most applicable method for the Latvian situation.

The main conclusion – in 2019 one euro invested in Riga Technical University returned to the national economy in the amount of 10.8 euros.

For further development of calculations, the research team decided to over evaluate the method for calculations and adjust it to the changes in the market caused by external circumstances, including Covid-19 pandemic. Also, for more precise results the multiplier will be calculated.

## 8. Acknowledgments

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## References

Borden, V. [vborden@iu.edu] (2021, December 18) *The Carnegie Classification of Institutions of Higher Education*. <https://www.citationmachine.net/apa/cite-a-website>  
*Business sectors (2019) Central Statistical Bureau of Latvia* <https://www.csp.gov.lv/en>

- Buzás, N., Lukovics, M. (2014) *Generations of Science Parks in the Light of Responsible Innovation - Responsible Innovation*, 2014, SZTE GTK, Szeged, pp. 193-208 (available on [https://www.researchgate.net/publication/265161511\\_Generations\\_of\\_Science\\_Parks\\_in\\_the\\_Light\\_of\\_Responsible\\_Innovation](https://www.researchgate.net/publication/265161511_Generations_of_Science_Parks_in_the_Light_of_Responsible_Innovation) ).
- Dobbins, M. (2011) *Journal "Explaining different pathways in higher education policy in Romania and the Czech Republic «Comparative Education»* 47:2, 223-245, DOI: 10.1080/03050068.2011.555116 <https://www.tandfonline.com/loi/cced20> *Domnīca Certus, Augstākās izglītības eksporta ekonomiskā nozīme un ietekme Latvijā, 2016* <http://certusdomnica.lv/agenda/augstakas-izglitibas-eksporta-ekonomiska-nozime-un-ietekme-latvija/Economy> (2019) Central Statistical Bureau of Latvia <https://www.csp.gov.lv/en>
- Education, Culture and Science (2017) Central Statistical Bureau of Latvia <https://www.csp.gov.lv/en>
- Education, Culture and Science (2019) Central Statistical Bureau of Latvia <https://www.csp.gov.lv/en>
- Etzkowitz, H. (2008) *The Triple Helix: University–industry–government innovation in action*. New York and London: Routledge, 2008. ISBN: 978-0-415-96451
- Eurostudent VI, 2017. *Studentu sociālie un ekonomiskie dzīves apstākļi Latvijā, 2017*. LU Filozofijas un socioloģijas institūts. <https://www.izm.gov.lv/lv/media/3943/download>
- Eurydice. The official website of European Union (2021, December 12). Welcome to Eurydice. Better knowledge for better education. <https://eacea.ec.europa.eu/national-policies/eurydice/>
- Maggio, Z. (2011). *Exploring Burton Clark's triangle of coordination in the context of contemporary relationships between states and higher education systems*. Unpublished manuscript, Department of Administration, Leadership, and Technology, New York University. (2021, December 13) [https://www.academia.edu/1539195/Exploring\\_Burton\\_Clark\\_s\\_Triangle\\_of\\_Coordination\\_in\\_the\\_Context\\_of\\_Contemporary\\_Relationships\\_Between\\_States\\_and\\_Higher\\_Education\\_Systems](https://www.academia.edu/1539195/Exploring_Burton_Clark_s_Triangle_of_Coordination_in_the_Context_of_Contemporary_Relationships_Between_States_and_Higher_Education_Systems)
- Medne, A., Lapiņa, I. *Sustainability and Continuous Improvement of Organization: Review of Process-Oriented Performance Indicators*. *Journal of Open Innovation: Technology, Market, and Complexity*, 2019, Vol. 5, No. 3, pp.1-14. e-ISSN 2199-8531. Available from: doi:10.3390/joitmc5030049
- Medne, A., Lapiņa, I., Zeps, A. *Sustainability of a University's Quality System: Adaptation of the EFQM Excellence Model*. *International Journal of Quality and Service Sciences*, 2020, Vol. 12, No. 1, pp.29-43. ISSN 1756-669X. Available from: doi:10.1108/IJQSS-09-2019-0108
- Observatory of the European University. *Methodological Guide*. Lugano, November 2006 (2021, December 12). [http://www.enid-europe.org/PRIME/documents/OEU\\_guide.pdf](http://www.enid-europe.org/PRIME/documents/OEU_guide.pdf)
- Ozoliņš, M., Stensaker, B., Gaile-Sarkane, E., Ivanova, L., Lapiņa, I., Ozoliņa-Ozola, I., Straujuma, A. *Institutional Attention to European policy Agendas: Exploring the Relevance of Instrumental and Neo-Institutional Explanations*. *Tertiary Education and Management*, 2018, Vol.24 No.4, pp.338-350. ISSN 1358-3883. e-ISSN 1573-1936. Available from: doi:10.1080/13583883.2018.1459820
- Statistical Data base (2019) Bank of Latvia, <https://statdb.bank.lv/lb/default.aspx?lv> and <https://www.bank.lv/en/>
- Sudmant, W. (2009) *The Economic Impact of University of British Columbia, Planning and Institutional Research*, UBC, 38 pages. Available at: [https://www.academia.edu/48416327/The\\_Economic\\_Impact\\_of\\_the\\_University\\_of\\_British\\_Columbia](https://www.academia.edu/48416327/The_Economic_Impact_of_the_University_of_British_Columbia)
- Unpublished information of Riga Technical University (2017-2019) Riga Technical University, <http://www.rtu.lv>
- Van Vught, F. (2021, December 12) *Classifying higher education institutions*. <https://www.oecd.org/education/imhe/37800154.pdf>
- Wisema, J.G. (2009). *Towards the Third Generation University. Managing the University in Transition – 2009*, Edwards Elgar Publishing, USA – 243 pages. ISBN-13: 978-1848442160

Yserte, Rubén & Gallo-Rivera, María. (2010). *The impact of the university upon local economy: Three methods to estimate demand-side effects*. *The Annals of Regional Science*. 44. 39-67. 10.1007/s00168-008-0243-x, 30 pages. Available at: <https://www.researchgate.net/publication/226242302> *The impact of the university upon local economy\_Three\_methods\_to\_estimate\_demand-side\_effects*