

# **Regional Innovation Impact Assessment Framework Case Study "Kaunas University of Technology"**

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# 1 Introduction

Kaunas University of Technology (KTU or University), established in 1922, has a long tradition of teaching and training large numbers of engineers of the country's thriving high-tech manufacturing industries (especially in the IT sector). KTU is one of the largest technical universities in the Baltic States and one of the most prominent high education schools in the country, with a leading position in many research fields.

The University provides studies of engineering, technologies, physical and social sciences, humanities and arts. There are 5 breakthrough areas of research and innovation, namely: health technologies, digital transformation and smart environment, new materials for industry and medicine, food technologies, innovation management. KTU is well-known to the world for ultrasound, organic chemistry, food science, mechatronics, systems diagnostics and many other achievements.

University is one of the key players in Kaunas region's innovation ecosystem and important Lithuania's innovation ecosystem element. KTU talents, infrastructure, leadership and strong constantly strengthened partnership with business, industry, public, local and international partners act as platform for innovation creation, development and growth.

The strategic objective of the University's is to become a leading university, competitive in the international space. The University's strategy is based on KTU traditions and strengths – links with industry, wide range of studies and scientific research related to technologies, aligned with the needs of the State and international development trends.

The Strategy is focused towards the strengthening of KTU's responsibility to the society and the country, towards consolidating its activities for the improvement of the people's life quality and acceleration of the statehood development. The main activities in this area are related to the transfer of knowledge and technologies created at the University so as they contributed to the country's vitality and its sustainable knowledge-based economic, social and cultural development.

Each year, the University invests in research in breakthrough fields and aims to transfer newly developed knowledge and technologies into studies and non-formal education. In this way, KTU contributes to the knowledge-based welfare of the local community. The scientific research and experimental development projects implemented by the University's researchers contribute to the country's economic, social and cultural growth and use the latest scientific knowledge and inventions to solve the issues relevant to the society.

**Table 1.** Key facts and figures <sup>(1)</sup>

	<b>2013</b>	<b>2018</b>
Budget	56.3 million euro	54.6 million euro
Of R&D income (%)	2.9 million euro (5.2 %)	2.6 million euro (4.7 %)
Academic staff (FTE)	949.16	779,38
Of research staff (FTE) (%)	107.77 (11.4 %)	130.81 (16.8 %)
Students	10 895	9 034
Publications (international)	442	586

<sup>1</sup> KTU activity reports, University research activity reports, 2013, 2018; <https://en.ktu.edu/documents/reports/>

## **2 Regional leadership**

Following KTU strategy to become a leading university and be competitive in the international space, University is taking the lead on local, national and international levels.

### **2.1. Local impact**

The University has a network of business partners, including the largest companies operating in Lithuania and abroad; strong relationships are maintained through events, activities and joint projects. In 2017, Kaunas region attracted largest investments in the country from international companies – “Continental”, “Hollister”, “Hella”, “Hegelmann Transporte”, which strengthen innovation ecosystem with potential business and R&D project partners. Playing an important role in Kaunas region innovation ecosystem, KTU maintains close direct contact with the biggest business players in the ecosystem and includes local community while organising meetings and events.

KTU actively collaborates with local government – Kaunas City Municipality. In cooperation with the city’s public institution “Kaunas IN” which is responsible for the promotion of investments and tourism, KTU participated in the program “Kaunas Start-ups” in 2018 and organised 20 open lectures and networking events including the hackathon using Kaunas region open data to find the best solutions for the city. This initiative supports start-ups and has a direct impact on the growth of the regional ecosystem.

### **2.2. National impact**

KTU plays an important role in the development of innovation policy in the country and the region by actively collaborating with the Lithuanian government – the Ministry of Economy and Innovation as well as the Ministry of Education, Science and Sport, Lithuanian Research Council, Agency for Science, Innovation and Technology and other organisations responsible for research, development and innovation (R&D&I). The University has actively participated in the development of the country’s Smart Specialisation Strategy. The professors of the University participate in working panels responsible for the development of the S3 strategy in Lithuania.

KTU is a member of several industrial associations, e.g. LINPRA, which unites more than 100 engineering companies and a number of clusters in the region, such as “Smart Technology Cluster”, “Photovoltaic Technology Cluster”, “Lithuanian Plastic Cluster”. In 2018 the process of the establishment of the Cluster of Aviation Specialists in Kaunas Region has been started on KTU initiative.

KTU acknowledges the importance of building transformative innovations upon new business models and organisational structures as well as meeting the global challenges. To support regional innovation ecosystem, KTU, in cooperation with Lithuanian University of Health Sciences, Vytautas Magnus University, Lithuanian Energy Institute, Hospital of Lithuania University of Health Sciences “Kauno klinikos”, Kaunas Science and Technology park and industrial company “Achema Group”, had set a platform for collaboration and joint activities – Association “Santaka Valley” – to support interdisciplinary scientific and applied research financially, to create proper conditions for high-quality research services to businesses, to coordinate technology development and its commercialisation by helping to establish start-ups and develop business companies, and to attract the necessary investment. Each member provided its expertise through research and development activities in the field of health technology and materials science and contributed to the entire field of activities.

### **2.3. International impact**

KTU has cooperation agreements with more than 350 higher education institutions in 50 countries of the world. Memorandums of Understanding, student and staff exchange and

“Erasmus+” inter-institutional agreements allow the University to develop strategic partnerships with foreign institutions in studies and research.

The University also operates cross-borders via participation in various networks, thus strengthening its international visibility. This international outlook shapes the University's identity and visibility, strengthens its reputation and expands the content of the University's activities. KTU, being a part of ECIU, the leading international consortium of research-intensive universities, actively participates in the development of knowledge-based economy. With the members of ECIU and CESAER, KTU actively presented its vision on the upcoming EU program for Research and Innovation (Horizon Europe). The researchers of KTU actively collaborate with the Lithuanian RDI Liaison Office in Brussels – LINO in order to drive the research strategy of the EU to face key challenges of humanity.

In addition to regional presence, the University is closely cooperating with the EIT and has recently established EIT Health, Food and Raw materials hubs at the University, where a broad range of entrepreneurship activities take place.

## **2.1 Sustainability**

University actively takes leadership in reaching sustainability. Responsible attitude towards environment and the society at the University is based on the philosophy of sustainable development activities. KTU is committed to the sustainable goals of the United Nations (17SDG) in all areas of its activities. The University aims to develop responsible future leaders and specialists in their areas, and attempts to achieve long-term goals related to the well-being of people and environment. Following the guidelines of socially responsible activities, the University conducts educational activities and initiates projects. The principles of sustainable development are integrated within all of the University's activities. It includes focusing on cultivating the culture of sustainable development and responsibility within the University's community and strengthening the University's responsibility to the environment, society and region.

KTU operates relevant projects for the city, the region and the country's economy, socio-cultural development, advises organisations on sustainable development, develops a socially responsible public opinion on environmental sustainability. It emphasises the most important dimensions of sustainable development: social responsibility, saving and effective use of natural resources.

### **3 Support to human capital development and entrepreneurship education**

There are 7 universities, 7 colleges and 10 vocational schools <sup>(2)</sup> in Kaunas city (including departments of higher education and vocational schools of other cities educational institutions), all together having more than 44 000 students, more than 60 % of whom are enrolled in the universities, more than 30 % – in KTU. University is one of the biggest talent sources in the region.

Considering the demographic situation of the country, 17 % less of students were admitted to KTU in 2018. The number of students decreased by 12 % in the last 3 years, thus, the University strategically focused on international students. The number of international PhD students has grown from 6 % in 2015 to 19.4 % in 2018. International students in KTU come from more than 60 countries - European Union, Turkey (the impact of the Erasmus + program), South East Asia, CIS countries, the Middle East, South America <sup>(3)</sup>.

The University's graduates are among the most sought after in the labour market. According to the Lithuanian magazine "Reitingai" (Eng. „Ratings") <sup>(4)</sup>, in 2018, KTU reached No.1 in the category which summarises the employers' opinion on KTU graduates and their employability. Outstanding network, close communication and building strong relations with business and industry are the factors for the high employment rate – about 76.9 % for the Bachelor's degree and 84.3 % for the Master's degree. The employment rate of the graduates of 2017 is 87 %. In the international ranking, KTU is among 800 world's top universities <sup>(5)</sup>.

KTU study programs (Electronics Engineering, Mechatronics, Programmable Automation Systems, Information Systems, Software Systems) are awarded with the special Investors' Spotlight quality label in last three years. This award shows that awarded programs meet business expectations and the high prospects of professionals in the job market. Such assessment is given by Investors' Forum, voluntary and independent business association uniting the biggest and most active Lithuanian investors, and Invest Lithuania, the official Government agency for Foreign Direct Investment and Business Development, taking into account market trends and business needs.

KTU applies various up-to-date methods of teaching/learning to actively involve the students in the learning process. Many lecturers of the University apply teaching/learning methods that are student-oriented, based on the students' involvement and active participation in the study process. Student satisfaction is one of the most rapidly increasing factors in 2018. According to the Lithuanian magazine "Reitingai" (Eng. "Ratings"), KTU is the 1st in Lithuania by this criterion (leaped from the 3rd place in 2017). The student satisfaction rank is measured by the student questionnaire which assesses study quality, competencies of administrative and teaching staff, quality of classes, and academic honesty.

KTU offers three prominent programs for students: GIFTED - talent development platform, providing all possibilities to the talented students to improve and use their skills in research and business, GUIDED - educational partnership between a more experienced and competent mentor and a motivated student and WANTED - program for the development of career competencies available to every student and many others – to train high quality professionals for future ecosystem development. Also Master+ – a model which allows mastering one MSc field by choosing the path of Field Expert or strengthening the interdisciplinary skills in addition to the main discipline by choosing the path of Interdisciplinary Expert.

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<sup>2</sup> Statistics Lithuania, <https://www.stat.gov.lt/home>

<sup>3</sup> KTU activity reports, University research activity reports, <https://en.ktu.edu/documents/reports/>

<sup>4</sup> "Reitingai" – analytical journal for higher education in Lithuania. It analyses qualitative sections and provides comprehensive and extensive research and ratings from all educational education institutions

<sup>5</sup> "QS World University Ranking", 2017

The basis of a strong innovation ecosystem is a strong bond between its elements. For 15 years in a row, KTU organises the largest career fair in the Baltic States – “WANTED Career Days”, where students from Lithuanian universities (>9000 in 2019), business and industry companies and organisations (>130 in 2018) meet. The event has already helped thousands of students to find jobs for, and many organisations to find the most talented employees and trainees. 85 % of all organisations participating in this fair are business companies – from the biggest investors in the region and KTU partners to growing start-ups, which already are a significant part of the ecosystem.

The industry in the region plays an important part in the University’s leadership. 45 % of the members of the University’s Council are from industry. These members along with other academic members have a considerable say in the governance and strategy of the University.

The alumni play an important role in embedding of the University in the region. The Alumni Association of KTU and its network are seeking to unite all generations of KTU graduates, to create and strengthen the traditions of communication and cooperation between the alumni and the University. Success stories in multinational companies, development of start-ups, experience and knowledge – everything is all about network development, creation of added value to the ecosystem, supporting young talents and academic community.

### **3.1 Enterprise development and entrepreneurship**

Kaunas startups ecosystem with more than 110 startups is second largest in Lithuania. The biggest number of startups in Kaunas operate in enterprise software development, health, game development and marketing, education and fintech sectors.

KTU is an important player in Kaunas and Lithuania startup ecosystem. Infrastructure of University, talents, deep cooperation with business traditions create favourable conditions for developing potential business ideas and talents. Cooperation with other Kaunas and Lithuania startups’ ecosystem players and stakeholders provides different opportunities to develop, and grow these ideas into real products and business, and talents to develop into solid organisations.

University acts as support provider (entrepreneurial education, attracting and inspiring new talent, matchmaking, various entrepreneurship workshops, trainings and other events, incubation, acceleration) and ecosystem developer (strategy and policy maker, ecosystem activists, resource providers).

KTU develops entrepreneurship in a form of formal education – according to the Lithuanian magazine “Reitingai” (Eng. „Ratings”), KTU has some of the best entrepreneurship study programs in the country: “Business and Entrepreneurship” (Bachelor’s degree), “Innovation Management and Entrepreneurship” (Master’s degree) and an individual module “Technology Entrepreneurship” where fundamentals of technology and R&D&I driven entrepreneurship are introduced to students; they are provided with basic knowledge on the processes. Students, who are encouraged to build up ideas together, form teams aiming to create a start-up. Business actively gets involved into educational process, share expertise and advises with students.

#### **Box 1.** Examples of students’ business ideas developed during study programs

**BeltaMom** – team, formed during the “Business and Entrepreneurship” module, presented the idea of a belt for pregnant women that tracks the condition of the fetus (baby's womb heart rate, number of movements, weight and water volume) from the 2nd trimester in Silicon Valley and won the first place at the Silicon Valley Innovation Challenge in „Best Healthcare Innovation” category in 2018.

**NanoLens** – team, formed during the “Technology Entrepreneurship” module, presented the idea of dissolving lens for glaucoma treatment in Silicon Valley and won the second

place at the Silicon Valley Innovation Challenge in “Best Global Innovation” category in 2017.

Moreover, according to “Comparative expert assessment of R&D activities 2018” by The Government Strategic Analysis Centre <sup>(6)</sup>, the Economics and Management field in KTU displays a clear networking strategy and purposefully identifies the actors important for its further development. Considering staff composition, external links, currently developed infrastructure and a clear strategy, it is assessed that the development of this field has a great potential to achieve or maintain very good or excellent ratings in the next 5 to 10 years.

In 2012, KTU established the first local academic start-up incubator – KTU Startup Space. Its main objective is the incubation of the early stage start-up teams while transforming their ideas into prototypes. In 2017, KTU Startup Space has become a national winner in the “European Enterprise Promotion Awards” for “Promoting the entrepreneurial spirit”. Also, the story of the incubation program prepared by KTU Startup Space was nominated for the “International ICIE 2017 Youth Incubator Awards”.

**Box 2.** KTU Startup Space results since 2012:

- more than 300 ideas have been incubated;
- more than 80 start-ups have been created;
- more than 280 jobs created;
- nearly 3 million euros paid in taxes.

The Startup Space works with business ideas covering a broad range of sectors: diagnostic and measurement technology, health, sustainable growth and socio-cultural development, technologies for sustainable development and energy science, smart environment and informational technologies, new materials for high technologies. Every year new businesses are established. To support this, KTU organises targeted events aimed at developing entrepreneurship culture and entrepreneurship, bringing together teams to attract investors. More than 95 000 EUR were attracted for the early stage start-ups in 2018.

KTU technology transfer managers, business development specialists, intellectual property project manager, market data analyst – full-time experienced specialists in their areas of expertise support start-ups. The team provides consultations about idea development, establishment of business, product commercialisation, intellectual property, R&D&I project management, funding opportunities, help with organisation of meetings with potential partners, prepare and fill applications for grants, contests, internships. The events organised by the specialists include the lectures about business development, funding and other related topics. The community shares its experience in the summits, organises demo days, hackathons.

Initiating and participating in the international projects and networks opens a lot of opportunities for start-ups at KTU and Lithuania. KTU network and active role in EIT Health and Food hub activities and beginning of activities in EIT Raw Materials hub offer many opportunities for business development – grants, acceleration programs, learning academies and schools, prizes, etc.

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<sup>6</sup> Government strategic analysis centre, <https://strata.gov.lt/lt/palyginamasis-ekspertinis-mtep-vertinimas/rezultatai>

**Box 3.** High-tech health innovations

Several years ago, the map of innovation ecosystem was complemented by the start-up "Fidens". In cooperation with KTU researchers, the company created ViLim Ball – innovative device, designed to reduce hand shake for essential tremor and morning stiffness for Rheumatoid arthritis. The technology helps to reduce uncontrollable shaking hands and is effective in 7 out of 10 cases.

Fidens creates high value-added health and medical equipment to tackle current issues, expanding into EU, US, and Asian markets, thus creating a B2B business model and highlighting product innovation, quality and, above all, consumer benefits.

Moreover, KTU leads international projects for entrepreneurship development funded by the European Union. These projects are focused on strengthening links between the Lithuanian and Polish, as well as Lithuanian and Latvian neighbouring districts. As a result, the guidelines, methodologies and other tools for entrepreneurship promotion are created, tested or improved – for entrepreneurs have been created and are available for everyone on [istartup.eu](http://istartup.eu).



## 4 Knowledge generation and knowledge transfer

All R&D&I infrastructure is assigned to the Open Access Centre and managed via R&D&I laboratories of the science institutes, concentrating research equipment in the large structures to increase the efficiency of the infrastructure. OAC ensures access to a wide range of research equipment through an online APCIS system. This system stores more than 1800 research services and 800 units of R&D&I equipment which can be easily used by business companies for a fixed hourly rate. At KTU NIEC, acting as a coordinator of the OAC, professional commercialisation support for researchers and companies are provided by the dedicated technology transfer managers and intellectual property manager. Professionals at KTU NIEC assist in finding industrial partners, manage R&D&I projects and consult regarding various innovation programs at national and international level. NIEC is an essential link connecting innovative technologies and knowledge-intensive companies, embodying a synergy of research, studies and practical implementation of ideas.

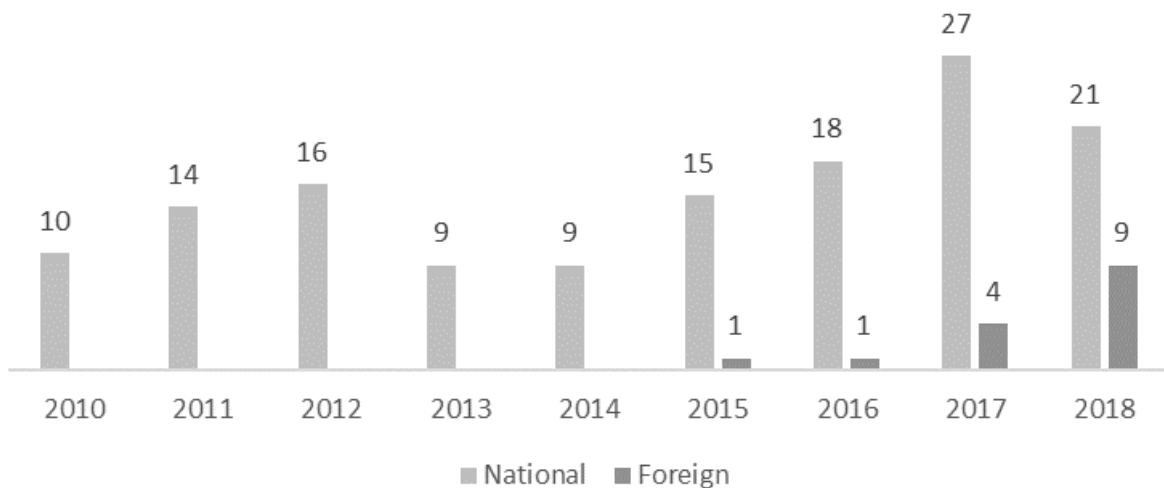
KTU revenue from R&D&I in 2018 has reached 2.6 million Euro (23 % – from foreign entities), which is approximately 12 % of all R&D&I contracts made between academia and business in Lithuania. KTU collaborates with many different organisations and companies from different countries of the world: Spain, Italy, Germany, Sweden, Poland, USA, France, Denmark, Switzerland, Belarus, Finland, Estonia, Norway, etc. The University has the latest amount of research equipment, experienced scientists, active cooperation with industry and business which allow having the leading positions in many areas of technology, physical and social sciences.

KTU had 49 international projects (Horizon 2020, FP7, EUREKA, etc.) and researchers participated in 54 projects of COST actions in 2018 aiming to collaborate in the preparation of scientific papers, making new networks and collaborate in the future projects with international R&D&I institutions. In autumn of 2018, KTU started Horizon 2020 Widening actions under the Spreading Excellence and Widening Participation Era-Chairs action project of "Industry 4.0 impact on management practices and economics" (IN4ACT) and Twinning action project "Knowledge-Empowered Entrepreneurship Network to position KTU at the forefront of EU research in entrepreneurship" (KEEN) coordinated by the University. From the beginning of 2019 the University started coordinating activities of Horizon 2020 under Marie Skłodowska-Curie Research and Innovation Staff Exchange (RISE) action project "Heavy metal free emitters for new-generation light "MEGA". These projects, with their objectives and activities, make a huge social engagement and main impact on the innovation ecosystem not only in the region, but in the entire country.

The world-class projects and research results have an impact on the publications by KTU scientists. In 2018, 586 international publications were published, 504 of which were published by the publishing houses in other countries, and 416 publications were published by ISI Web of Science and Scopus databases with Impact Factor (IF) in other countries.

Participation in national and international projects leads to new ideas and innovations. In 2018, the University's researchers and students developed 21 inventions; also, KTU received 9 Lithuanian patents and 4 patents from US, EU and Japan patent offices. At the end of 2018, 21 national and 9 international patents were valid on behalf of KTU. In 2017, KTU signed a cooperation agreement between the State Patent Bureau of the Republic of Lithuania and KTU NIEC became the Industrial Property Information Centre PATLIB – the first centre of this kind in Lithuania, established in cooperation with universities.

**Figure 1.** Valid patents



**Box 4.** Innovative technologies

Group of KTU scientists has invented the innovative method for indoor positioning of people and things using wireless network. It localises a human being or an object within an accuracy of 1 meter and it works in any device with Wi-Fi function.

Smart industry solutions, such as advanced process control technologies, human-machine interface, condition monitoring, smart logistics with advanced transport, real-time warehouse management are but a few areas which could benefit from the innovative WLAN-based positioning method invented at KTU.

European Patent Office has officially confirmed the issue of the patent for the method for the indoor positioning of WLAN devices in the near future.

## 5 Vision for future development and conclusion

The University's vision is to become a leading European university which activities are based on the development and transfer of knowledge and technologies.

Main focus areas:

- Innovation ecosystem development through relationship with national and international companies;
- Partnership with international partners (university networks, EIT) in order to initiate larger innovation projects;
- Shared infrastructure, educational programs as well as entrepreneurship programs;
- Emphasis on research excellence aiming to become one of the main players in the regional innovation ecosystem;
- Life-long learning and blended learning.

The University will continue focusing on the innovation ecosystem development through close ties with industry and international partners. Shared infrastructure, educational programs as well as entrepreneurship programs are at most importance in the near future. Moreover, the University is investing in building three centres of excellence focusing on ICT, Health Technologies and, in partnership with another university, Cultural and Creative Industries.

In addition, brand new facilities for prototyping will be built, which will strategically support innovation through hands-on experience for students as well as companies which need prototyping facilities.

**Figure 2.** Visualisation of unique interdisciplinary prototyping laboratory centre at KTU



The University focuses on all the capacities of research excellence aiming to become one of the main players in the regional innovation ecosystem. Sustainable development, which promotes responsible, environmentally-friendly behaviour and ecological culture, is one of the priorities of KTU activities.

## **List of abbreviations and definitions**

KTU	Kaunas University of Technology
IT	Information technologies
R&D	Research and development
R&D&I	Research, development and innovation
FTE	Full-time equivalent
ECIU	The European Consortium of Innovative Universities
CESAER	European association of leading specialised and comprehensive universities of science and technology
EIT	European Institute of Innovation and Technology
LINPRA	Lithuanian engineering industries association
MOSTA	Research and Higher Education Monitoring and Analysis Centre
OAC	Open Access Centre
APCIS	Open Access Centre Information System
NIEC	National Innovation and Entrepreneurship Centre

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