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Knowledge Valorisation in Doctoral Studies in Latvia: Entrepreneurship and the Development of Research Competencies in the Study Process

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Abstract. The purpose of this paper is to analyse the self-assessment data of Latvian doctoral students relating to their entrepreneurship and research competencies and to explore how it correlates and what can be done to promote valorisation during the study process.

An online survey using the QuestionPro platform was used to collect the data. The survey was fully completed by 43 doctoral students from various higher education institutions, and it consisted of 123 statements in which doctoral students assessed their competencies on a 7-point Likert scale. Five structured interviews were conducted in order to identify the supporting environment and other aspects that have an impact on the development of entrepreneurship and research competencies.

The results of the research demonstrate a relatively low self-assessment of entrepreneurship competencies, which points to why doctoral students are unable to commercialise their knowledge. Unlike entrepreneurship competencies, research competencies can be considered as very high. According to the data, there is no clear correlation between entrepreneurship competence and research competence. The results also point to the fact that it is not sufficient to develop only one of the two competencies to ensure the valorisation of knowledge.

For data to be fully representative, a higher number of respondents would have been desirable as well as a greater diversity of study programs represented, assuming that knowledge valorisation approaches and opportunities differ across sectors.

Nonetheless, the results can be used for the development and implementation of the valorisation initiatives of higher education institutions.

Keywords: entrepreneurship competence, research competence, knowledge valorisation, doctoral students

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Žinių valorizacija doktorantūros studijose Latvijoje: verslumo ir mokslinių tyrimų kompetencijų ugdymas studijų procese

Santrauka. Straipsnio tikslas – išanalizuoti Latvijos doktorantų įsivertinimo duomenis apie jų verslumo ir mokslinių tyrimų kompetencijas bei ištirti, kaip šie kintamieji susiję ir ką galima padaryti skatinant valorizaciją studijų procese.

Duomenys rinkti internetinės apklausos būdu „QuestionPro“ platformoje. Apklausos anketą užpildė 43 doktorantai iš įvairių aukštųjų mokyklų; ją sudarė 123 teiginiai, atsakydami į juos doktorantai savo kompetencijas vertino pagal 7 balų Likerto skalę. Tikintis atskleisti palankius aplinkos ir kitus įtakos verslumo ir mokslinių tyrimų kompetencijoms ugdyti turinčius veiksnius, papildomai atlikti penki struktūruoti interviu.

Tyrimo rezultatai atskleidė gana žemą verslumo kompetencijų įsivertinimą, o tai leidžia suprasti, kodėl doktorantai nesugeba komercializuoti savo žinių. Mokslinių tyrimų kompetencijos, kitaip nei verslumo kompetencijos, gali būti laikomos labai aukštomis. Rezultatai taip pat atskleidė, kad verslumo ir mokslinių tyrimų kompetencijos reikšmingai nekoreliuoja. Be to, siekiant žinių valorizacijos, neužtenka ugdyti tik vieną iš dviejų kompetencijų.

Kad duomenys būtų labiau reprezentatyvūs, tyrimui reikėtų pasitelkti didesnį respondentų skaičių ir platesnę studijų programų įvairovę, nes žinių valorizacijos metodai ir galimybės tam tikrose mokslo srityse gali gerokai skirtis. Nepaisant to, šio tyrimo rezultatai gali būti panaudoti plėtojant ir įgyvendinant aukštųjų mokyklų valorizacijos iniciatyvas.

Pagrindiniai žodžiai: verslumo kompetencija, mokslinių tyrimų kompetencija, žinių valorizacija, doktorantai.

Introduction

Universities determine the direction of the knowledge economy and social processes in many respects (Giuri et al., 2019), and their traditional mission of teaching and research has broadened to interactions with industry and with society more generally (Kapetaniou & Lee, 2017). Competence-based education, in accordance with the increasingly diverse and interconnected world influenced by globalisation and modernisation, is topical from a purely economic viewpoint because it contributes to boosting productivity and market competitiveness, minimising unemployment through developing an adaptive and qualified labour force and creating an environment for innovation in a world dominated by global competition (OECD, 2018a).

The European Commission identified a sense of initiative and entrepreneurship as one of the eight key competencies necessary for a knowledge-based society and which all individuals should have to foster start-ups, innovation, and successful professional development (Bacigalupo et al., 2016) in order to bridge the gap between education and the labour market (Ferreras-Garcia et al., 2019). More recently, the COVID-19 crisis has caused rapid changes in educational institutions around the world, creating numerous challenges that require urgent solutions (Slišāne et al., 2021), which once again highlights the notion that the competence of entrepreneurship and digital literacy are the most significant competencies necessary for the global and national economic and business environment of the 21st century (Turulja et al., 2020).

Entrepreneurship competencies in the context of education have mostly arisen from the political interest in overcoming cycles of economic activity and are based on the need to stimulate the economy and prosperity (Slišāne & Rubene, 2021). Demand for entrepreneurial skills for all graduates has expanded (Jack & Anderson, 1999; Klofsten, 2000;

Rae & Carswell, 2000; Blenker et al. 2006; Miclea, 2004; Kneale, 2005) to enable an individual to cope with uncertainty, variability, and complex problem situations in both work and personal life (Poon Teng Fatt et al. 1995; Ravasi & Turati, 2005; Gibb, 2007). Altan states that the concept of entrepreneurship is often associated with the concept of innovation, which does not always have to be economic or technological or even result in a tradable product for the market – it can be a social innovation, for instance, in an education system, environmental policy or social inequity (Altan, 2015). The increasing global inequality of opportunities and individual marginalisation call for initiative and innovation to promote individual participation in democratic institutions, social cohesion and justice, and human rights and autonomy (United Nations, 2020), which all have a profound impact on society as well as on the economy.

According to the European Commission, Latvian higher education and research and innovation systems are facing challenges with attracting and retaining young doctoral graduates, establishing closer collaboration between the academic, research and business sectors, and building innovation capacity in the private sector (European Commission, 2021). One of the key reasons for the hindrance to the emergence of new ideas and ventures is a lack of entrepreneurial competencies, culture, and mindset in higher education (European Commission, 2021). Although entrepreneurial capacity-building has been on the agenda for many years, there is still no consensus on what the distinctive elements of entrepreneurship as a competence are (Slišāne & Rubene, 2021), and this significantly deters the process of its development.

Latvia is rather behindhand in knowledge valorisation. The evidence of this fact is its low position in the Knowledge Economy Index, which takes into account whether a country's environment is conducive for knowledge to be used effectively for economic development, and in the Knowledge Index,[1] which measures a country's ability to generate, adopt, and diffuse knowledge (Knoema, 2021). Its position in the Research, Development, and Innovation Index is insignificantly higher and contributes to increasing knowledge at the national and regional levels. This index serves as a driver for economic growth and sustainable development and is closely linked to other sectors, as it provides essential inputs to the entire system. It is composed of three pillars: research and development, innovation in production, and social innovation (Knoema, 2021).

Entrepreneurship and research competencies were chosen for this study, since one of the objectives of entrepreneurship is to create added value for society and to be able to commercialise it (Mitchelmore &Roweley, 2013; Morris et al., 2013; Jeffrey & Spinelli, 2007; Seikkula – Leino et al., 2010; Amos & Onifade, 2013), while research is the foundation for scientific activity, which makes the combination of these two competencies a fruitful base for knowledge valorisation.

[1] The knowledge economy (KE) is the main driver of sustainable development, wealth creation, and job creation. The KE concept is primarily based on providing economic resources with knowledge tools, including digital and technological knowledge assets and innovative and creative skills. It is composed of three pillars: knowledge competitiveness, economic openness, and financing and value added.

The aim of this pilot research is to find out the self-assessment of the entrepreneurship and research competencies of Latvian doctoral students and to clarify their readiness for knowledge valorisation. This will lay a foundation for conducting a full-scale study in the future where the weakest components of the competencies would be analysed in detail alongside the hypothesis that the development of entrepreneurship and research competence causes an increase of knowledge valorisation among doctoral students. In addition, in the pilot research five interviews were conducted with doctoral students from different fields to elucidate the relevance of the learning environment in stimulating the development of entrepreneurship competencies, as these produced the lowest results in the self-assessment survey.

Entrepreneurship and Research Competence

The first business course at Harvard Business School was introduced in 1947 by Myles Mace. Since then, entrepreneurship has become an important academic field (Gartner & Vesper, 1994; Katz, 2003; Kuratko, 2005), and proof of its significance can be found in many spheres of life, not only in business-related activities. The European Commission first referred to the importance of entrepreneurship education in 2003 in its Green Paper (Bacigalupo et al., 2016), which confirms that the development of the entrepreneurial capacity of European citizens and organisations has been one of the key policy objectives for the EU and Member States for many years. There is a growing awareness that entrepreneurial skills, knowledge, and attitudes can be learned, which will lead to the widespread development of entrepreneurial mindsets and culture, which, in turn, will benefit both individuals and society (Bacigalupo et al., 2016).

According to the Organisation for Economic Co-operation and Development's (OECD) publication *Developing Entrepreneurship Competencies*, entrepreneurship includes creativity, problem-solving skills, initiative, the ability to combine resources, and financial and technological knowledge (OECD, 2018b). There is a core set of entrepreneurship competencies that allow individuals to identify, create and respond to opportunities to create value by pooling resources (Stenholm et al., 2021) and demonstrating self-efficacy, confidence, and a determination to overcome obstacles. These skills can be advanced over time with study and practice (Lans et al., 2014; Tan & Ng, 2006; Gibb & Hannon, 2006; Borjas, 2003; Kirby, 2004). One of the goals of developing the competence of entrepreneurship is to reduce the fear of failure by raising awareness and providing the knowledge and skills necessary to help individuals deal with problem situations (OECD, 2018b; Leon, 2017; Bacigalupo et al., 2016, Mitchelmore & Roweley, 2013; Seikkula-Leino et al., 2010).

Technology- and science-intensive industries, as well as the dynamic growth of scientific and technical information, create a need for the development of creative thinking, inventiveness, the ability to solve research problems, and skills in independent search activities (Loginov & Kovalev, 2017). A competence for research provides a person with an opportunity to model, analyse, transform, and make responsible decisions, as well as

to critically evaluate results (Loginov & Kovalev, 2017). Components of the research competence can be of benefit when a potential entrepreneurial idea arises and a systematic approach to its estimation and valuation is needed (for example, proof for market compliance, competitor analysis, added value, market segmentation, etc.).

To build constantly evolving ecosystems that support the emergence and nurturing of new potential ideas and entrepreneurs, it is necessary to strengthen the entrepreneurial culture of higher education institutions and scientific institutes and invest in the development of students' and staff members' entrepreneurial skills (European Commission, 2021).

Knowledge Valorisation

Valorisation is a word of French origin that translates as surplus value (Andriessen, 2005). The surplus value that is created in social valorisation relates to the maintaining of societal values and is created through the engagement of a university in the life of its region, city, and society in general (van de Burgwal et al., 2019). Andriessen states that the origins of the term "knowledge valorisation" can be traced back to the Lisbon Agenda and the debate about the European economy becoming the world's most dynamic knowledge-based economy in which the value of knowledge is measured by the degree of its usefulness (Andriessen, 2005).

Valorisation is knowledge value creation and an activity that gives an opportunity to address social challenges (Hladchenko, 2016). Knowledge valorisation, conversely, is the transfer of knowledge from one party to another for economic benefit (Andriessen, 2005) and is a process in which value is added to new knowledge in order to transform it into a new product, process, or service in the market (van Geenhuizen, 2010).

The process of knowledge valorisation is a long route that begins with universities and envisages the commercialisation of products created at the university and the popularisation, patenting, implementation, and application of the results of applied research for the establishment of new companies (RTU, n.d.). According to Benneworth and Jongbloed (2010), valorisation is not only about commercialisation, which is focused primarily on making a commercial profit. It instead has a broader scope and looks at the creation of societal value from knowledge by translating research findings into innovative products, services, processes and/or business activities (Benneworth & Jongbloed, 2010; de Jong, 2015; Hladchenko, 2016). It incorporates the creation of spin-off companies and the filing of patent applications on the one hand and the writing of books and the development of guidelines for policy improvements on the other (van de Burgwal et al., 2019).

Knowledge valorisation is a rather new phenomenon of wealth creation, which started to grow in Europe in the early 1980s (Charles & Howells, 1992) and has now fully entered the research policy of modern universities (van Geenhuizen, 2010). Although research institutes have placed the broad social impact of knowledge more prominently on the agenda to contribute to the European knowledge economy (Dale, 2010), they have not yet succeeded in overcoming the European knowledge paradox (Vilarinho, 2015). The inconsistency between outstanding scientific insights and limited innovation out-

comes that is described by this paradox is generally considered to be best addressed by improvements in knowledge transfer and knowledge valorisation processes (Van Vught, 2009).

Valorisation stimulates the creation of new businesses, thus helping to boost a country's competitiveness. Through knowledge valorisation, universities not only overcome the problem of decreased public funding but create resources for further research and successfully building the knowledge economy in the country and contributing to the social needs of the region (Hladchenko, 2016).

Entrepreneurial competence is seen as distinct in order to turn research and education data into economic value and, more broadly, to create social value (OECD/EU, 2018).

Consequently, it is essential to clarify (1) doctoral students' self-assessment of their entrepreneurship competence and research competence in order to make any hypothesis of the liabilities between the data of the knowledge valorisation and competencies mentioned above, (2) whether these competencies are connected and which components of the competencies are self-assessed as the weakest, (3) whether students are able to commercialise their knowledge in order to understand if the concept as itself is clear, and (4) what an evolving learning environment for entrepreneurship competence should be.

Methodology

This study assessed the level of doctoral students' entrepreneurship competence and research competence using the online survey platform QuestionPro, while the supporting environment and other aspects that have an impact on the development of these competencies were identified through structured interviews. The online survey was completed by 43 doctoral students, and five of them participated in the interviews. The survey consisted of 123 statements in which doctoral students self-assessed their competencies on a 7-point Likert scale (1 – "does not characterise me", 7 – "completely characterises me").

The competence of entrepreneurship was evaluated through 15 sub-competencies: coping with uncertainty, ambiguity and risk (3 statements), creativity (5 statements), ethical and sustainable thinking (3 statements), financial and economic literacy (3 statements), learning through experience (3 statements), mobilising resources (3 statements), mobilising others (4 statements), motivation and perseverance (2 statements), planning and management (3 statements), self-awareness and self-efficacy (3 statements), spotting opportunities (4 statements), taking the initiative (3 statements), valuing ideas (4 statements), having a vision (4 statements), and working with others (3 statements).

The competence of research was evaluated through 13 sub-competencies: application of research methodology (4 statements), communication and publicity (9 statements), cooperation in the research process (5 statements), critical analysis of information (7 statements), data analysis (4 statements), data interpretation and drawing conclusions (5 statements), design of the research (9 statements), practical application of research results (4 statements), research ethics (5 statements), research interest (4 statements), research organisation (7 statements), responsible research (3 statements), and understanding the context of the research (7 statements).

The level of each sub-competence is defined as the mean value of doctoral students' self-assessments for the corresponding statements. The survey data used in the publication is gathered from the "Assessment of Competencies of Higher Education Students and Dynamics of Their Development in the Study Process" pilot study, meaning the sample is not representative. The results of the survey were analysed through descriptive statistics; Spearman's correlation between the entrepreneurship sub-competencies and the research sub-competencies was also explored. In order to determine internal consistency, Cronbach's alpha was calculated for each sub-competence separately.

The survey was available for completion from 26 November 2020 to 13 March 2021. The structured interview consisted of four questions, and the results were analysed using content analyses. The data was analysed using Microsoft Excel, Python 3, and SPSS version 22. The study considered all ethical research standards in accordance with the General Data Protection Regulation (GDPR). The survey was anonymous and participation in it was completely voluntary.

Results

The study participants represented different learning domains and it can be concluded that the scope represented by the participants is relatively broad (Chart 1).

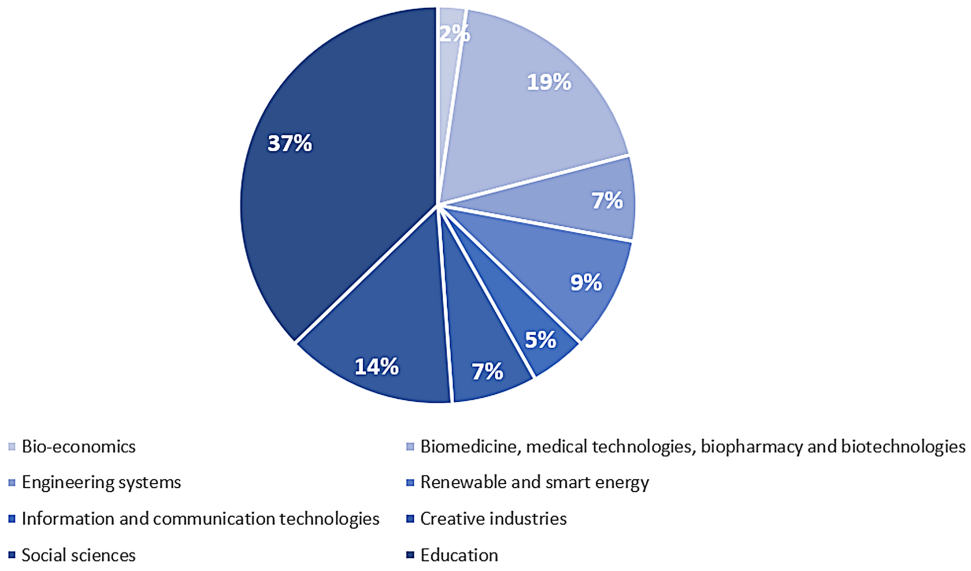

Chart 1. *Student relative distribution by learning domains*

The value of Cronbach's alpha was calculated for each entrepreneurship sub-competence to determine the internal consistency of the survey (Table 1). Cronbach's alpha values range from 0.72 to 0.94, indicating that the survey's internal consistency is considered to be high.

An analysis of the mean values of each entrepreneurship sub-competence leads to the conclusion that the entrepreneurship competence is relatively low. Eight entrepreneurship sub-competencies on the 7-point Likert scale had mean values ranging from 5 to 6 and seven entrepreneurship sub-competencies ranged between 4 and 5. The most highly rated entrepreneurship sub-competencies were taking the initiative (mean = 5.55, SD = 1.13), learning through experience (mean = 5.40, SD = 1.08), and self-awareness and self-efficacy (mean = 5.40, SD = 1.06). On the other hand, the sub-competencies with lower mean values were having a vision (mean = 4.51, SD = 1.24), financial and economic literacy (mean = 4.32, SD = 1.48), and spotting opportunities (mean = 4.22, SD = 1.30).

This also points to reasons why doctoral students are unable to commercialise their knowledge. In order to commercialise scientific activities, it is necessary to be able to see the results of a study in a different context, including linking them to their economic potential.

Table 1. *Results of doctoral students' self-assessment of entrepreneurship sub-competencies*

Sub-competence	Cronbach's alpha	Items	Mean value	Median	SD	Variation
Coping with uncertainty, ambiguity, and risk	0.76	3	5.18	5.33	1.26	1.58
Creativity	0.87	5	4.56	4.60	1.38	1.91
Ethical and sustainable thinking	0.75	3	4.82	4.67	1.14	1.29
Financial and economic literacy	0.83	3	4.32	4.33	1.48	2.18
Learning through experience	0.88	3	5.40	5.33	1.08	1.17
Mobilising others	0.89	4	4.99	5.00	1.08	1.16
Mobilising resources	0.77	3	5.07	5.00	1.01	1.01
Motivation and perseverance	0.72	2	5.30	5.50	1.06	1.13
Planning and management	0.93	3	5.32	5.33	1.07	1.14
Self-awareness and self-efficacy	0.85	3	5.40	5.33	1.06	1.13
Spotting opportunities	0.84	4	4.22	4.25	1.30	1.68
Taking the initiative	0.94	3	5.55	5.67	1.13	1.29
Valuing ideas	0.86	4	4.74	4.50	1.24	1.53
Having a vision	0.85	4	4.51	4.25	1.24	1.55
Working with others	0.72	3	4.84	5.00	1.19	1.41

By analysing the relative distribution of doctoral students' ratings based on entrepreneurship sub-competence levels, it can be concluded that these sub-competencies were developed at one of the lowest levels and in only a relatively small segment of the respondents (Chart 2).

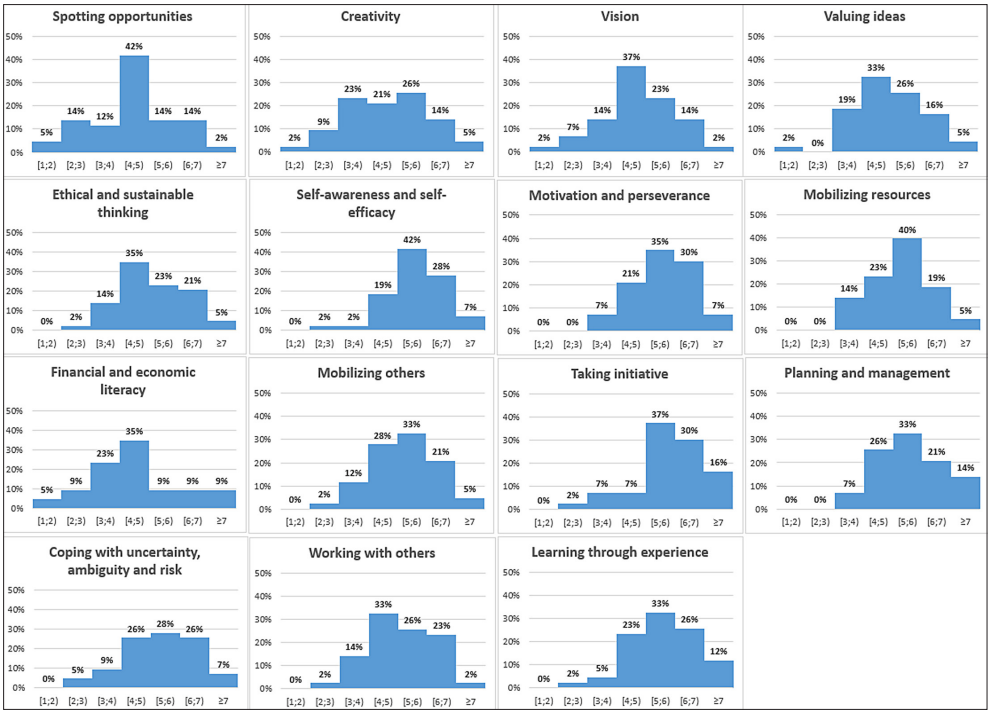

Chart 2. *Relative distribution of doctoral students' self-assessment of entrepreneurship sub-competencies*

In 13 of the 15 entrepreneurship sub-competencies, less than 10% of the respondents evaluated their sub-competencies as low (below 3 on the Likert scale); however, more than 10% evaluated their creativity (12%) and spotting opportunities (19%) as low. Similarly, when analysing the higher levels of the assessments, there are six sub-competencies that more than a third of respondents rated as high (above 6): taking the initiative (47%), motivation and perseverance (37%), learning through experience (37%), self-awareness and self-efficacy (35%), planning and management (35%), and coping with uncertainty, ambiguity, and risk (33%).

For the analysis of the research competence among doctoral students, Cronbach's alpha value was determined for each of the sub-competencies (Table 2). The results show that for 12 out of 13 sub-competencies, Cronbach's alpha values are between 0.83 and 0.93 and can thus be considered as very high. For the remaining sub-competence (responsible research), Cronbach's alpha value is 0.52; even if some of the statements are removed, it cannot be increased to 0.7. This sub-competence should therefore be revised in future research.

After analysing the mean value of each research sub-competence, it can be concluded that the most highly rated sub-competencies are research ethics (mean = 5.82, SD = 0.83), responsible research (mean = 5.74, SD = 0.85), and understanding the

context of the research (mean = 5.73, SD = 0.75). The results indicate that doctoral students have the right mindset and understand the importance of ethical and responsible research.

On the other hand, the sub-competencies that were evaluated lower were communication and publicity (mean = 5.15, SD = 1.21), practical application of research results (mean = 4.92, SD = 1.29), and cooperation in the research process (mean = 4.59, SD = 1.31). These relatively low evaluations are in line with the assessment of entrepreneurship sub-competencies. The inability to use research results in practice could be compensated by cooperation with other researchers, as they could help discover different or even transdisciplinary perspectives, but communication and cooperation are assessed as the lowest of all research sub-competencies.

Table 2. *Results of doctoral students' self-assessment of research sub-competencies*

Sub-competence	Cronbach's alpha	Items	Mean value	Median	SD	Variation
Application of research methodology	0.87	4	5.41	5.50	1.12	1.26
Communication and publicity	0.92	9	5.15	5.22	1.21	1.45
Cooperation in the research process	0.85	5	4.59	4.60	1.31	1.71
Critical analysis of information	0.84	7	5.65	5.86	0.84	0.71
Data analysis	0.83	4	5.41	5.25	0.98	0.96
Data interpretation and drawing conclusions	0.87	5	5.40	5.60	1.00	1.00
Design of the research	0.89	7	5.53	5.67	0.85	0.72
Practical application of research results	0.89	4	4.92	5.00	1.29	1.67
Research ethics	0.84	5	5.82	6.00	0.83	0.69
Research interest	0.90	4	5.59	5.75	1.07	1.14
Research organisation	0.93	7	5.29	5.43	1.09	1.19
Responsible research	0.52	3	5.74	6.00	0.85	0.72
Understanding the context of the research	0.84	7	5.73	5.86	0.75	0.57

An analysis of doctoral students' self-assessments shows that there is only one sub-competence that was assessed as low (below 3) by more than 10% of respondents – cooperation in the research process (12%) (Chart 3).

On the other hand, 10 out of 13 research sub-competencies were evaluated as high (above 6) by more than 33% of the respondents: research ethics (60%), responsible research (51%), understanding the context of the research (47%), application of research

methodology (47%), research interest (42%), critical analysis of information (42%), design of the research (40%), research organisation (37%), data interpretation and drawing conclusions (35%), and data analysis (33%). This suggests that the research competence of doctoral students is considered to be high.

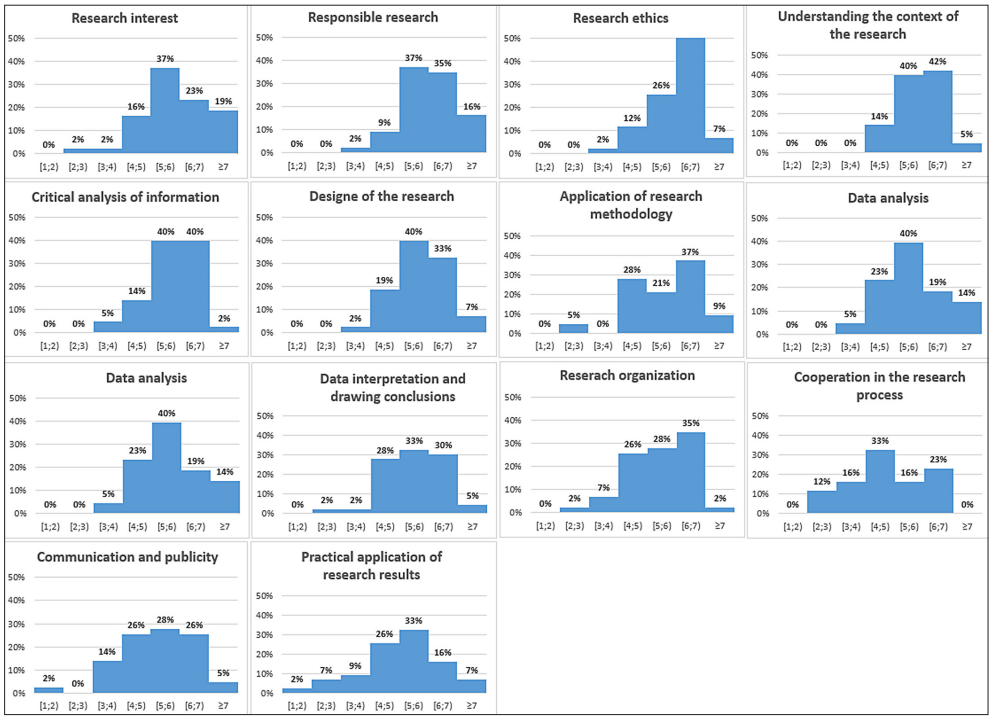

Chart 3. *Relative distribution of doctoral students' self-assessment of research sub-competencies*

A Spearman's rank correlation test was performed to determine whether entrepreneurship sub-competencies correlate with research sub-competencies. The results show that there is a strong correlation ($r_s \geq 0.6$) between only a few sub-competencies: self-awareness and self-efficacy and critical analysis of information ($r_s = 0.62$), mobilising resources and practical application of research results ($r_s = 0.61$), planning and management and communication and publicity ($r_s = 0.63$), planning and management and research interest ($r_s = 0.62$), and learning through experience and research interest ($r_s = 0.63$).

Out of 195 potential correlations, only five are strong; moreover, they have values that are very close to the lower limit of the interval, which allows us to conclude that there is no clear correlation between entrepreneurship competence and research competence. It also points to the fact that it is not sufficient to develop only one of the two competencies to ensure the valorisation of knowledge.

Table 3. *Correlation between entrepreneurship and research sub-competencies (Spearman's correlation)*

Sub-competence	Application of research methodology	Communication and publicity	Cooperation in the research process	Critical analysis of information	Data analysis	Data interpretation and drawing conclusions	Designe of the research	Practical application of research results	Research ethics	Research interest	Reserach organisation	Responsible research	Understanding the context of the research
Spotting opportunities	.19	.32*	.20	.21	.37*	.47**	.25	.33*	.21	.24	.15	.09	.29
Creativity	.09	.22	.18	.05	.19	.29	.09	.22	.32*	.18	-.08	.09	.31*
Having a vision	.34*	.51**	.28	.19	.26	.37*	.28	.50**	.44**	.53**	.28	.31*	.43**
Valuing ideas	.08	.28	.31*	.11	.22	.24	.12	.17	.31*	.32*	.20	.09	.18
Ethical and sustainable thinking	.16	.46**	.19	.25	.28	.40**	.25	.42**	.43**	.41**	.26	.22	.49**
Self-awareness and self-efficacy	.55**	.42**	.34*	.61**	.45**	.63**	.55**	.41**	.58**	.43**	.46**	.35*	.49**
Motivation and perseverance	.23	.47**	.22	.38*	.25	.45**	.33*	.40**	.39**	.41**	.20	.13	.33*
Mobilising resources	.34*	.51**	.32*	.28	.44**	.46**	.32*	.61**	.36*	.39**	.27	.35*	.42**
Financial and economic literacy	-.11	.11	.14	.02	.06	.12	-.09	.17	.12	.28	-.10	-.03	.07
Mobilising others	.33*	.42**	.42**	.32*	.29	.45**	.25	.50**	.50**	.39*	.16	.26	.40**
Taking the initiative	.24	.49**	.36*	.45**	.30	.36*	.30	.37*	.50**	.51**	.33*	.33*	.31*
Planning and management	.39**	.63**	.48**	.37*	.38*	.40**	.35*	.46**	.45**	.62**	.34*	.41**	.34*
Coping with uncertainty, ambiguity, and risk	.37*	.44**	.28	.37*	.50**	.51**	.29	.57**	.41**	.49**	.22	.20	.34*
Working with others	.22	.38*	.38*	.30	.30	.37*	.20	.36*	.42**	.48**	.21	.24	.28
Learning through experience	.23	,45**	,41**	,37*	.27	.28	.25	,38*	,52**	,62**	.25	,49**	,37*

** = Correlation is significant at the 0.01 level (2-tailed)
* = Correlation is significant at the 0.05 level (2-tailed)

In order to clarify the relevance of the learning environment in stimulating the development of the entrepreneurship competence, five interviews were conducted with doctoral students from different fields. When analysing the answers to question 1 ("What added (commercial) value has your research work generated or will generate?"), it can be concluded that students have given relatively little thought to commercialising their knowledge, which is best described by one of the respondents' answers: "none". However, some of the answers indicate that although knowledge valorisation is not a priority issue, it can potentially be prioritised in the future.

The replies indicate that this commercial product could be, for example, the researcher himself as an expert: "focusing on the 'status' created by the degree itself – planning, possibly, to offer advice to companies on public relations and communication issues".

When analysing the answers to question 2 of the interview ("How do you plan to commercialise your intellectual property, or how have you done so already?"), it can be seen that social science doctoral students are able to create podcasts and a variety of educational materials. The responses show that the commercialisation of these products has not yet been carried out, nor is it a priority, but the students are aware of the potential to implement it in the future:

> As a "by-product" of our research, a podcast has emerged in which we discuss the topic that we are dealing with – modern motherhood. This product could be commercialised, but it would be better served to educate society and change public opinion.

> Basically, developing materials and solutions that are available for public use with reference to me as the author or one of the authors.

When analysing question 3 ("Does the academic environment help you to think about how to commercialise your knowledge and intellectual property?"), it can be seen that most of the interviewees responded briefly and congruously: "no". One of the interviewees also revealed a potential reason for the low level of knowledge valorisation:

> I don't feel pressure to commercialise my knowledge – there's a call to share the results, educate, talk to the public about what you studied. There have been discussions on the brilliance and misery of commercialisation, on the ethics and duties of a scientist, and on the difference between fundamental and applied research, but [the valorisation of knowledge] has not been a priority, at least until now.

This answer also points to the fact that the teaching staff at the University of Latvia are focused on research, while the practical use of knowledge for commercial purposes is considered to be a non-scientific area.

The responses to question 4 ("How could the academic environment contribute to the commercialisation of your intellectual property (results of your study) by making it more accessible to the public and to its problems?") include proposals such as: recruiting experts from the business environment in the study process, promoting student participation in various projects, and including the theoretical and practical nature of obtaining project funds in the study process.

When comparing the mean values of the entrepreneurship competence (mean = 4.95) and research competence (mean = 5.40), it can be concluded that the research competence was assessed significantly higher by doctoral students. In addition, the research sub-competences that are more relevant to entrepreneurship were evaluated lower. This could mean that the learning process does not promote these competences and that while the emphasis is on research activities, their practical application is neglected. On the other hand, the analysis of data from the interviews points to a lack of an entrepreneurial mindset. Perhaps the biggest obstacle is the traditional approach that sets scientific achievements above material values.

Discussion

The relatively low self-assessment of doctoral students' entrepreneurship competence can be considered one of the reasons behind the lack of commercialisation of their knowledge. In order to commercialise scientific activities, it is necessary to have a vision outside the academic field that would benefit from the recognition and use of opportunities. This vision should show how scientific work can benefit individuals as well as the society; various skills, such as the ability critically value ideas, mobilise resources (both material and human), work in a team, cope with uncertainty, ambiguity and risk, to plan and manage time and resources, as well as self-awareness and self-efficacy, would accelerate the achievement of these results.

The sub-competencies with the lowest mean values are having a vision, financial and economic literacy, and spotting opportunities, which could cause significant delays for any action to happen. The development of students' vision would broaden their viewpoints and promote openness to the identification and utilisation of opportunities, but financial and economic literacy is essential to making sure that value-creating activities last over the long term.

From the results of the survey, it can be observed that the research competence was assessed the highest, which is a reasonable result due to the fact that this is the main instrument for scientific duties. On the other hand, students' self-assessments of their entrepreneurship competence were not as high, and this can be interpreted as being due to the fact that, currently, investment in the development of students' and staff members' entrepreneurship competence is scarce (European Commission, 2021).

Although the research competence of the doctoral students is considered to be high, their relatively low evaluations of the research sub-competencies are in line with their assessment of the entrepreneurship competence. The inability to use the results of their research in practice could be compensated by their cooperation with other researchers, who could help them discover different or even transdisciplinary perspectives, but communication and cooperation were assessed as the lowest of all research sub-competencies.

There is no clear correlation between the entrepreneurship competence and the research competence. This points to the fact that it is not sufficient to develop only one of the two competencies to ensure the valorisation of knowledge, and it is highly recom-

mended that universities develop both competencies, as their combination can make a significant contribution to society.

Following the structured interviews, it can be concluded that although knowledge valorisation is not a priority issue, it could potentially be prioritised in the future. The interviewees were not familiar with the concept of knowledge valorisation, which highlights two questions. Firstly, is there enough information and support for those students who choose to commercialise their ideas? Secondly, are there differences in valorisation processes and in opportunities between various study programs?

This leads us to a limitation of this study – for the data to be fully representative, a higher number of respondents would be desirable as well as a greater diversity of study programs represented to ascertain if knowledge valorisation approaches and opportunities differ across sectors.

Further research with a more representative sample and studies using good examples from other countries is planned to be done in order to recommend concrete actions for the development and implementation of valorisation initiatives in higher education institutions.

Conclusion

The inconsistency between outstanding scientific insights and limited innovation outcomes is considered to be best addressed by making improvements in knowledge valorisation processes (Van Vught, 2009). The competence of entrepreneurship and research expertise are both required for knowledge valorisation.

In this study, the doctoral students' self-assessment of their entrepreneurship competence (mean = 4.95) on a 7-point Likert scale was relatively low. In addition, sub-competencies, such as having a vision (mean = 4.51, SD = 1.24), financial and economic literacy (mean = 4.32, SD = 1.48), and spotting opportunities (mean = 4.22, SD = 1.30), which are closely linked to innovation, were assessed the lowest. The research competence (mean = 5.40) was evaluated higher than the entrepreneurship competence, but in the analysis of its sub-competencies, it can be concluded that these were also quite low, such as communication and publicity (mean = 5.15, SD = 1.21), practical application of research results (mean = 4.92, SD = 1.29), and cooperation in the research process (mean = 4.59, SD = 1.31). These sub-competencies are essential for doctoral students to be able to use their research in different contexts and situations, thus creating commercial innovations.

The student interviews confirmed the survey's results and revealed deeper reasons for the incomplete knowledge valorisation. The doctoral students' primary focus was on research work, but its commercialisation was considered irrelevant. Students also pointed to the need to reshape the learning environment by supplementing it with different elements of knowledge commercialisation, such as attracting business experts, training for different forms of fundraising, and creating an environment for interdisciplinary research.

The results indicate that there is no significant correlation between the competencies of entrepreneurship and research, which indicates that in order to improve knowledge

valorisation, it is not sufficient enough to develop only the research expertise in students; instead, it is necessary to create a learning environment in which students can develop both of these competencies equally well.

However, the sample was not fully representative, and the results of the study merely indicate the main trends and highlight the outline of this little-studied topic, revealing directions for future studies. Further research with a more representative sample should be conducted to generalize the results on a broader scale.

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