



Research Article

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## Insights on Sustainable Universities from Economic and Statistical Perspectives

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### Abstract

*Currently, the issues on sustainability receive extremely high interest, especially from young generation. This makes universities as key participants in sustainable development as far as they provide wide possibilities for engagement in the process. Despite many studies devoted to universities as participants of sustainable development, there still is insufficient knowledge about their contribution to the process. Mostly, studies are qualitative and consider certain examples of good practices, which do not provide insights on common and different characteristics and trends of universities' contribution to sustainable development. This is the result of the early stage of development of the reporting about universities' sustainable efforts what limits possibilities to carry quantitative analysis. The paper aims, first, to search for characteristics of universities' contribution to sustainable development and, second, to detect trends by using numerical secondary data worked up in UI GreenMetric World University Ranking. The paper focuses on universities from European Union. Special attention is devoted to countries' economic development level as far as scientific literature suggests that the level of economic development may affect involvement in sustainable development. Research findings allows to indicate that there are both common and distinct characteristics across the cases from economically high and less developed countries what is significant for further policy-making and popularizing of sustainability idea across universities in the European Union. Universities continue to improve practices and search for new accents. However, universities' intention to report about their sustainable efforts in long-term perspective for continuing data collection must be more active.*

**Keywords:** universities, sustainable development, economic development level, data

### 1. Introduction

Currently, society is extremely interested in the issues of sustainability. Especially high attention from students and pupils is (e.g. Vaughan, 2019). This makes universities as key participants in sustainable development as far as universities provide wide possibilities for students and pupils engagement in the process. Despite widespread understanding that universities are significant participants in sustainable development, a knowledge on their contribution is insufficient (e.g. Shiel et al., 2016).

Universities contribute to sustainable development by realizing educational and research functions, managing campus daily needs (Beynaghi et al., 2016; Holm et al., 2015). Usually, such aspects in scientific literature are presented as examples of good practices (e.g. Wang et al., 2019). In turn, overall characteristics and trends of universities' contribution to sustainable development receive significantly less attention. However, one can see that scientists start to devote attention also to more general and long-term cases (e.g. Olalla & Merino, 2019; Ramisio et al., 2019).

The general peculiarity, which characterizes studies about universities' contribution to sustainable development, is qualitative approach to analysis. This, mostly, is the result of the early stage of development of reporting about universities' sustainable efforts (e.g. Alonso-Almeida et al., 2015; Huber & Bassen, 2018). Moreover, some scientists conclude that there are not common guidelines on how universities can report on their sustainable efforts (e.g. Lopatta & Jaeschke, 2014).

The exception is the UI GreenMetric World University Sustainability Ranking (UI GreenMetric) (Universitas Indonesia, 2018) that provides an attempt to introduce common approach that ranks world universities according to their sustainable efforts. This ranking also provide numerical data as a result of voluntary survey of universities. Thus, the UI GreenMetric World University Sustainability Ranking (e.g. UI GreenMetric, 2014, 2018) database with worked up secondary data provide possibility also for quantitative analysis of universities' contribution to sustainable development. Insufficient general guidance for universities how better to promote sustainability in campus, in local communities and society as a whole ensures timeliness of quantitative analysis.

Quantitative analysis, which searches for characteristics and detects development trends, offers understanding of common and different practices and intentions. Such understanding is important for promotion of success across universities' community, which contribute to sustainable development, and society as a whole. Special attention in such analysis must be devoted to country economic development level, where universities, which contribute to sustainable development, are placed. Such focus allows for findings how universities from economically high and less developed countries make their contribution to sustainable development. Common and distinct peculiarities are key elements for further policy-making and popularizing of sustainability idea across universities in the European Union.

The paper aims, first, to search for characteristics of universities' contribution to sustainable development and, second, to detect trends in economically high and less developed countries of European Union by using data from UI GreenMetric World University Rankings.

The paper is organized as follows. The second chapter reviews how scientific literature considers universities' contribution to sustainable development. The third chapter explains the methodology and data employed in the paper for characterizing universities' contribution to sustainable development and detecting trends in European Union's economically high and less developed countries. The fourth section analyzes characteristics and trends of universities contribution to sustainable development in the European Union's economically high and less developed countries. The fifth section concludes the paper.

## 2. Literature Review

The term 'sustainability' is flexible (e.g. Dühr, 2005) and has different interpretations (Peer & Stoeglehner, 2013), which also allows for different understanding of the role of universities for sustainable development. As Shiel et al. (2016) indicate, universities' potential make them significant for sustainable development, in turn, realization of universities' direct functions makes their participation possible (Sedlacek, 2013). Additionally, Borges et al. (2017) indicate on potential of student organizations for promotion of sustainable development.

Currently, society see universities as 'change agents' (e.g. Peer & Stoeglehner, 2013) also in the process of sustainable development. For example, Beynaghi et al. (2016) offer three possible sustainable development scenarios for universities – socially-, environmentally- and economically-oriented. Thus, society asks universities to widen their contribution not only in educational programs and preparing of action plans, but also in practices and policies (Alonso-Almeida et al., 2015; Holm et al., 2015).

However, in context of sustainable development, mainly, focus is put on education and in lesser degree on economic, environmental and social aspects (e.g. Karatzoglou, 2013). Universities contribute to sustainability through realizing their educational functions, for example, by producing human capital (Lehmann et al., 2009), developing sustainable curriculum that meet regional societal and industrial needs (Hens et al., 2017), preparing students and staff, which is able to support sustainability concept (Sammalisto et al., 2015; Lanero et al., 2013). In this context, Grindsted (2016) highlights the students' belief that sustainable competences are important for labor market.

However, currently, incorporation of sustainability concept in universities' policies and practices as well become widespread (e.g. Cleverdon et al., 2017). As scientific literature discovers, reduction of environmental impact is one of the main ways, in which universities contribute to sustainable development (Alonso-Almeida et al., 2015). For example, Martinelli et al. (2016) highlight importance of climate change issues for universities. Zhou et al. (2013) in their study indicate that energy consumption of higher education institutions has large effect on financial and environmental issues. Gallardo et al. (2016) using the example of waste management, also indicate that universities as

organizations with big amount of staff and students should participate in processes, which reduce negative environmental impacts. Additionally, universities start to test environmental impacts from their staff (e.g. Wynes et al., 2019). All in all, universities practically aim to reduce negative environmental impacts in terms of water, waste, energy, climate change, transportation, infrastructure (e.g. Davidová, 2016; Gallardo et al., 2016; Shiel et al., 2016; Wang et al., 2019).

However, the progress towards environmentally-friendly campus requires financial support (e.g. see Zhou et al., 2013 for energy issues) and interest from regional actors (Dagiliute & Liobikiene, 2015). Additionally, scientists find that such interest in sustainable development may differ among regions taking into account their economic development level. For example, Akgün et al. (2014) and Sedlacek (2013) mention that economically higher developed regions usually pay more attention to sustainability issues than economically less developed regions. Although, at countries level, economically high developed countries are main initiators to contribute to sustainable development (e.g. Sedlacek 2013), at universities level, the universities from both economically high and less developed countries contribute to sustainable development.

It is noteworthy that there are support instruments for sustainability concept in European Union. For example, the European Commission (2014) provides financial support within the EU Cohesion Policy. According to the European Commission (2014), such support includes investments in energy efficiency and savings, renewable energy, greenhouse gas emissions reductions, sustainable urban mobility, as well as active participation in research and innovation activities.

Despite widespread understanding that universities are significant for sustainable development, the process of reporting about their sustainable efforts and progress is at early stage of development (e.g. Alonso-Almeida et al., 2015; Huber & Bassen, 2018) and there are not common guidelines on how universities can report on their sustainable efforts (e.g. Lopatta & Jaeschke, 2014).

The UI GreenMetric World University Sustainability Ranking (Universitas Indonesia, 2018) provides an attempt to introduce common approach with the aim to rank world universities according to their sustainable efforts. The initiative already gained interest from universities and researchers. Number of universities that participate increases. Although, one cannot know whether all sustainable universities participate and this makes difficult studying of the issue.

Overall, Suwartha and Sari (2013) indicates that the UI GreenMetric World University Rankings positively contribute to possibility to compare success in sustainable efforts among universities. Despite the critical views on methodology applied in UI GreenMetric World University Ranking (e.g. Lauder et al., 2015; Ragazzi & Ghidini, 2017), scientists recognize significance of both continuing improvements of ranking and the existing positive contribution to dissemination of sustainability concept across universities worldwide. Lauder et al. (2015) also highlight that the UI GreenMetric World University Rankings is necessary for reaching desired changes in sustainable development, because the ranking provides useful tool for assessing sustainability efforts in terms of 'Setting and Infrastructure', 'Energy and Climate Change', 'Waste', 'Water', 'Transportation', 'Education and Research'.

### 3. Methodology and Data

This paper analyzes the characteristics and trends of universities' contribution to sustainable development in European Union economically high and less developed countries in 2014 and 2018. Universities are divided into four cases by economic development level of country of origin, participation and repeated participation in UI GreenMetric World University Ranking (UI GreenMetric, 2014, 2018).

In 2014, UI GreenMetric World University Rankings included 119 universities from such European Union countries as Austria, Belgium, Cyprus, Czech Republic, Denmark, Finland, France, Greece, Germany, Hungary, Ireland, Italy, Latvia, Lithuania, Netherlands, Poland, Portugal, Romania, Slovenia, Spain, Sweden, and UK. In 2018, universities from Malta and Bulgaria were added. Overall number of universities from European Union in UI GreenMetric World University Ranking in 2018 increased till 158. European Union universities from UI GreenMetric World University Ranking in 2014 and 2018 are marked as the case 'all' in the paper.

The case 'same' allows for detecting trends in universities' contribution to sustainable

development. The case 'same' includes 91 university from Austria, Cyprus, Finland, France, Greece, Germany, Hungary, Ireland, Italy, Latvia, Lithuania, Netherlands, Poland, Portugal, Romania, Slovenia, Spain, Sweden, and UK, which participated in UI GreenMetric World University Ranking in 2014 and repeated their participation in 2018.

The above mentioned countries were divided in economically high and less developed according to Eurostat data (Eurostat, 2019) by detecting whether an economic development level in a country is higher or lower than the European Union's average.

The paper analyzes data on total scores and several categories – 'Setting and Infrastructure', 'Energy and Climate Change', 'Waste', 'Water', 'Transportation', and 'Education and Research' from UI GreenMetric World University Ranking (Universitas Indonesia, 2018; UI GreenMetric, 2014, 2018).

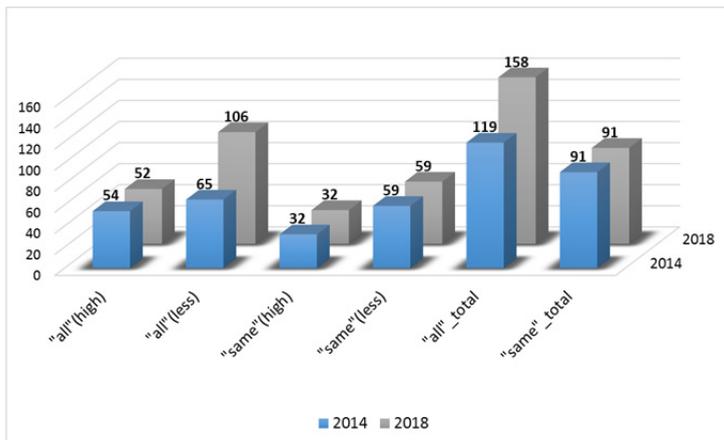
First, within the analysis of four cases under research, correlation coefficients were calculated between total scores and categories in 2014 and 2018 for detecting accents for contribution to sustainable development. Second, analysis of descriptive statistics – minimal, maximal, average and desirable scores – allows for detailed understanding of sustainable performance across different categories for each case under research.

Finally, the paper considers data from UI GreenMetric World University Ranking as 'sustainable content' and 'sustainable action'. 'Sustainable content', i.e. category 'Education and Research', means creation of study programs and research activities, which focus on sustainability. 'Sustainable action', i.e. categories 'Setting and Infrastructure', 'Energy and Climate Change', 'Waste', 'Water', and 'Transportation', means management of campus daily needs in an environmentally-friendly manner. The paper analyze whether universities consider 'sustainable content' and 'sustainable action' as complimentary processes, which is of high importance for wide promotion and continuity of sustainability concept within both universities and society as a whole.

As a result of quantitative analysis the paper offers findings on general practices and particular accents in universities contribution to sustainable development among countries with different development level and allows for detecting common and different trends.

#### 4. Research Results

In European Union, universities are considered as key players for development also in terms of sustainable development (European Union Regional Policy, 2011). The data on UI GreenMetric World University Ranking (UI GreenMetric, 2014, 2018) allow for evaluation of universities efforts to introduce sustainability concept in both campus and community as a whole.



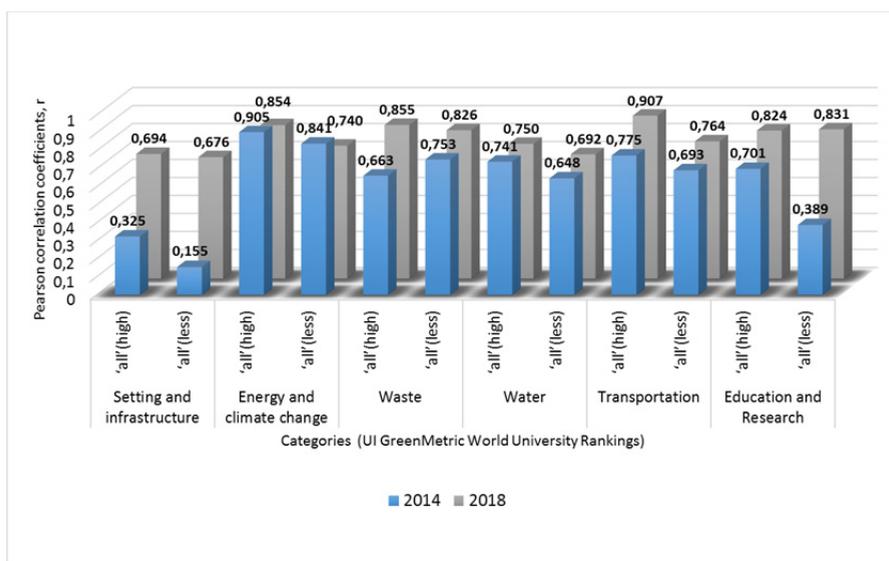
**Figure 1:** Amount of European Union universities participating in UI GreenMetric World University Ranking in 2014, 2018.

**Source:** author's calculations using UI GreenMetric World University Ranking (UI GreenMetric, 2014, 2018)

Figure 1 demonstrates that overall number of European Union universities, which report about sustainable efforts, increased. Additionally, the most of universities repeat participation. The data indicate that about 76.5% (91 of 119) of European Union's universities, which reported about sustainable activities in 2014 continue to report in 2018 as well. This is positive tendency for monitoring the progress of sustainable development and highlights universities high interest to contribute. However, it is noteworthy that European Union universities' share in UI GreenMetric World Universities Ranking decreased in 2018 comparing with 2014. In 2018, number of participants from around the world increased more than twice, in parallel, share of European Union universities decreased from about 33% in 2014 till about 22% in 2018 (author's calculations based on UI GreenMetric, 2014, 2018).

In context of economic development level, universities from economically high developed countries participate in lesser degree than from economically less developed countries and this difference increased twice in 2018. Additionally, number of participants from economically high developed countries a little but decreased in 2018. The most of participants in 2014 continue to participate in 2018 from both economically high and less developed countries.

Differences between the cases analyzed from economically high and less developed countries are observed in practices as well (see Figure 2).



**Note:** 'all' – all European Union universities that participate in UI GreenMetric World University Rankings in 2014 ( $N=119$ ;  $N_{(high)}=54$ ;  $N_{(less)}=65$ ), in 2018 ( $N=158$ ;  $N_{(high)}=52$ ;  $N_{(less)}=106$ ) from economically high developed (high) and less developed (less) countries.

**Figure 2:** Linkage between total score and categories in all European Union universities included in UI GreenMetric World University Rankings in 2014, 2018, Pearson correlation coefficients

**Source:** author's calculations using UI GreenMetric World University Ranking (UI GreenMetric, 2014, 2018)

For example, the highest difference between universities from economically high and less developed countries is observed in 2014 in category 'Education and Research'. Correlation coefficients allow for conclusion that 'Education and Research' has middle strong linkage with universities sustainable performance for the cases from economically high developed countries and weak linkage for the cases from economically less developed countries. However, in this category universities from economically less developed countries made the brightest improvement (correlation coefficient increased twice in 2018) and ensured higher significance of 'Education and

research' for sustainable performance in 2018 (see Figure 2).

Other category, which experienced bright improvements, is 'Setting and Infrastructure'. It is noteworthy to indicate that universities from both economically high and less developed countries demonstrated weak linkage between 'Setting and Infrastructure' and sustainable performance in 2014 (see Figure 2). In 2018, the linkage became middle strong, which indicates on increasing significance of the category to sustainable performance and better results among universities.

Categories 'Waste', 'Water', and 'Transportation' are linked with sustainable performance for the cases from both economically high and less developed countries in the same way. In the most cases, this linkage became stronger in 2018 (see Figure 2). In turn, category 'Energy and Climate Change' demonstrated opposite tendency and correlation coefficients decreased for the cases from economically high and less developed countries in 2018.

Changes in correlation coefficients indicate on possible changes in accents in sustainable activities in universities as well. In 2014, 'Energy and Climate Change' strongly correlated with sustainable performance by demonstrating the highest correlation coefficients for the cases from both economically high and less developed countries (see Figure 2). In 2018, accents changed and distinguished across the cases. For example, one can see the highest correlation coefficient between 'Transportation' and sustainable performance for the cases from economically high developed countries. In turn, the cases from economically less developed countries switched accents on 'Education and Research' (see Figure 2).

Descriptive data of universities sustainable activities allow for detailed understanding of sustainable performance across different categories.

**Table 1:** Descriptive statistics on categories in all European Union universities included in UI GreenMetric World University Ranking in 2014, 2018

Categories	Case	Min		Max		Average		Desirable
		2014	2018	2014	2018	2014	2018	
Setting and Infrastructure	'all' <sup>(high)</sup>	83	75	1031	1350	527,5	857,2	1800
	'all' <sup>(less)</sup>	149	125	928	1275	511,5	724,3	
Energy and Climate Change	'all' <sup>(high)</sup>	375	450	2100	1700	1417,3	1281,7	2100
	'all' <sup>(less)</sup>	435	200	1905	1800	1097,1	1008,3	
Waste	'all' <sup>(high)</sup>	600	300	1800	1800	1518,1	1361,5	1800
	'all' <sup>(less)</sup>	519	300	1725	1800	1260,4	1014,6	
Water	'all' <sup>(high)</sup>	0	100	1000	1000	811,2	619,2	1000
	'all' <sup>(less)</sup>	0	0	1000	800	612,0	359,0	
Transportation	'all' <sup>(high)</sup>	525	375	1675	1700	1145,5	1137,5	1800
	'all' <sup>(less)</sup>	275	325	1525	1650	850,9	864,2	
Education and Research	'all' <sup>(high)</sup>	76	375	976	1800	522,1	1287,0	1800
	'all' <sup>(less)</sup>	75	75	779	1800	416,6	1017,9	

**Note:** 'all' – all European Union universities that participate in UI GreenMetric World University Ranking in 2014 (N=119; N<sup>(high)</sup>=54; N<sup>(less)</sup>=65), in 2018 (N=158; N<sup>(high)</sup>=52; N<sup>(less)</sup>=106) from economically high developed (high) and less developed (less) countries.

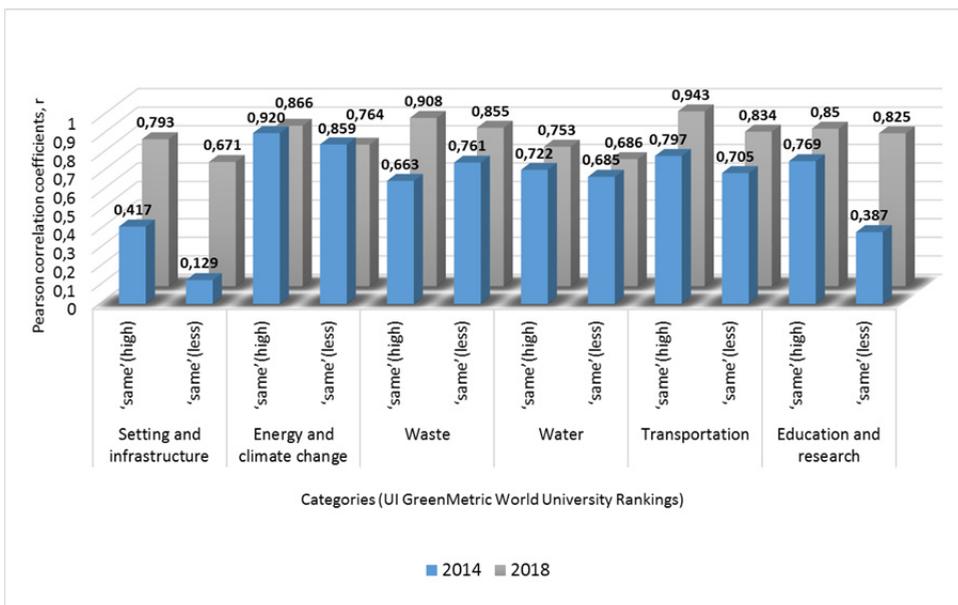
**Source:** data and author's calculations using UI GreenMetric World University Ranking (UI GreenMetric, 2014, 2018)

UI GreenMetric World University Ranking provide methodology, according to which there are desirable scores for each category (Universitas Indonesia, 2018). This allows for aspiration for better sustainable performance. It is noteworthy that the cases under research reached desirable scores in category 'Energy and Climate Change', 'Waste', 'Water', and 'Education and Research'. Universities from economically high developed countries reached desirable scores in 'Energy and Climate Change' in 2014. However, in 2018, scores decreased (see Table 1). In category 'Waste', universities from economically high developed countries reached desirable scores in both 2014 and 2018. 'Water' and 'Education and Research' are the categories, in which universities from both economically high and less developed countries reached desirable scores in 2014 or 2018 (see Table 1).

Minimal and maximal scores allow for understanding how differentiated are universities in their sustainable activities. For example, 'Water' is the only category, where score null was observed for the cases from both economically high and less developed countries (see Table 1). Such result indicates that no sustainable action was in the category 'Water' in some cases in 2014 and 2018. The data on changes in minimal scores indicate that some universities are able to move closer to sustainability concept in their activities, however still do not demonstrate sufficient capacity. It is noteworthy that minimal scores are very far from desirable scores, which indicates on necessity in higher activity and/or much financial support. However, the fact that minimal values mostly increased or remained the same, except the category 'Setting and Infrastructure' for the cases from economically higher developed countries, indicate on positive trends.

In parallel, one can see that maximal scores increased, for example, for such categories as 'Setting and Infrastructure', 'Transportation', and 'Education and Research'. This demonstrates aspiration to reach desirable scores and thus to contribute to sustainable development in bigger extent. However, average scores indicate that, probably, new universities in the ranking yet are not reached the best performance and in 2018 comparing with 2014 average, scores, mostly, decreased. Additionally, average scores highlight that universities from economically high developed countries reached higher scores than from economically less developed countries.

It is important to check the trend for universities, which participate in both 2014 and 2018. This focus on the same universities group demonstrates more precise development tendency.



**Note:** 'same' – universities that participate in UI GreenMetric World University Ranking in both 2014 and 2018 (N=91; N<sub>(high)</sub>=32; N<sub>(less)</sub>=59) from economically high developed (high) and less developed (less) countries.

**Figure 3:** Linkage between total scores and categories in those European Union universities that are included in UI GreenMetric World University Ranking in both 2014 and 2018, Pearson correlation coefficients

**Source:** author's calculations using UI GreenMetric World University Ranking (UI GreenMetric, 2014, 2018)

In terms of trends, the cases of universities marked as the 'same' from economically high and less developed countries significantly strengthened positions in the category 'Setting and Infrastructure'

(see Figure 3). Correlation coefficients also demonstrate that the cases from economically high developed countries in 2018 mainly put accents on categories 'Waste' and 'Transportation'. Correlation coefficient between sustainable performance and the category "Energy and Climate Change" was the only, which decreased in 2018 in comparison with 2014 in economically high developed countries.

The case of universities marked as the 'same' from economically less developed countries mostly linked sustainable performance with the category 'Energy and Climate Change' in 2014. In this case the accents were switched in favor of 'Waste', 'Transportation', and 'Education and Research' in 2018 (see Figure 3). The category 'Education and Research' experienced the brightest growth of correlation coefficient (see Figure 3).

In general, the case of universities, which report on sustainable activities in both 2014 and 2018, demonstrate similar tendencies in sustainable activities as all European Union universities, which participated in 2014 or 2018. However, these data allow for not only general findings about accents and success in sustainable activities, but also for persistent trends. These trends highlight significant increase of importance of such categories as 'Setting and Infrastructure', 'Education and Research', 'Waste', and 'Transportation' in universities with sustainable vision and ability to report about sustainable activities in long-term perspective.

**Table 2:** Descriptive statistics on categories in those European Union universities that are included in UI GreenMetric World University Ranking in both 2014 and 2018

Categories	Case	Min		Max		Average		Desirable
		2014	2018	2014	2018	2014	2018	
Setting and Infrastructure	'same' <sup>(high)</sup>	83	350	1031	1350	538,1	932,0	1800
	'same' <sup>(less)</sup>	232	200	928	1300	518,2	727,5	
Energy and Climate Change	'same' <sup>(high)</sup>	375	450	2100	1700	1410,8	1355,5	2100
	'same' <sup>(less)</sup>	435	425	1905	1800	1105,3	1019,1	
Waste	'same' <sup>(high)</sup>	600	300	1800	1800	1528,1	1354,7	1800
	'same' <sup>(less)</sup>	519	300	1725	1800	1258,9	1023,3	
Water	'same' <sup>(high)</sup>	0	250	1000	1000	825,3	680,5	1000
	'same' <sup>(less)</sup>	0	0	1000	800	625,9	400,0	
Transportation	'same' <sup>(high)</sup>	550	375	1675	1700	1145,6	1162,5	1800
	'same' <sup>(less)</sup>	275	400	1525	1650	842,5	927,1	
Education and Research	'same' <sup>(high)</sup>	76	600	976	1800	531,5	1318,8	1800
	'same' <sup>(less)</sup>	75	250	779	1800	420,9	1105,9	

**Note:** 'same' – universities that participate in UI GreenMetric World University Ranking in both 2014 and 2018 (N=91; N<sup>(high)</sup>=32; N<sup>(less)</sup>=59) from economically high developed (high) and less developed (less) countries.

**Source:** data and author's calculations using UI GreenMetric World University Ranking (UI GreenMetric, 2014, 2018)

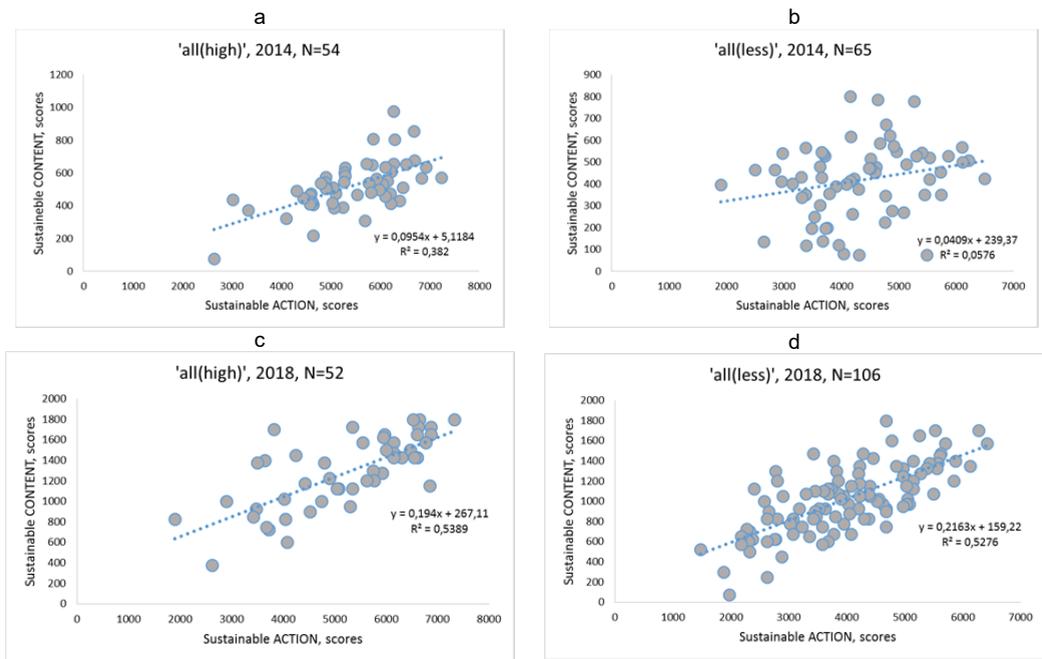
Descriptive statistics about the universities marked as the 'same' indicate that desirable scores in 2018 were reached in categories 'Waste', 'Water', 'Education and Research' in both the cases from economically high and less developed countries in 2014 or 2018. Growing trend was observed for categories 'Setting and Infrastructure', 'Transportation', 'Education and Research'.

Minimal scores significantly increased for category 'Setting and Infrastructure', 'Education and Research', 'Transportation' for both the cases from economically high and less developed countries as well as for the category 'Water' for the case from economically high developed countries. Other categories demonstrated moderate increase or even decrease in scores.

Maximal values increased moderate or even decreased, except category 'Education and Research'. Average scores demonstrate switch in accents and overall weakening in performance in some categories as 'Energy and Climate Change', 'Waste', 'Water'.

Different sustainable activities in their sense are linked and must be coordinated in daily practices. It is difficult to act in a sustainable manner and do not understand this concept or to

understand but not apply in a practice. Thus, overall spreading and continuity of sustainability concept depends on matching between 'sustainable content' and 'sustainable action' in universities.

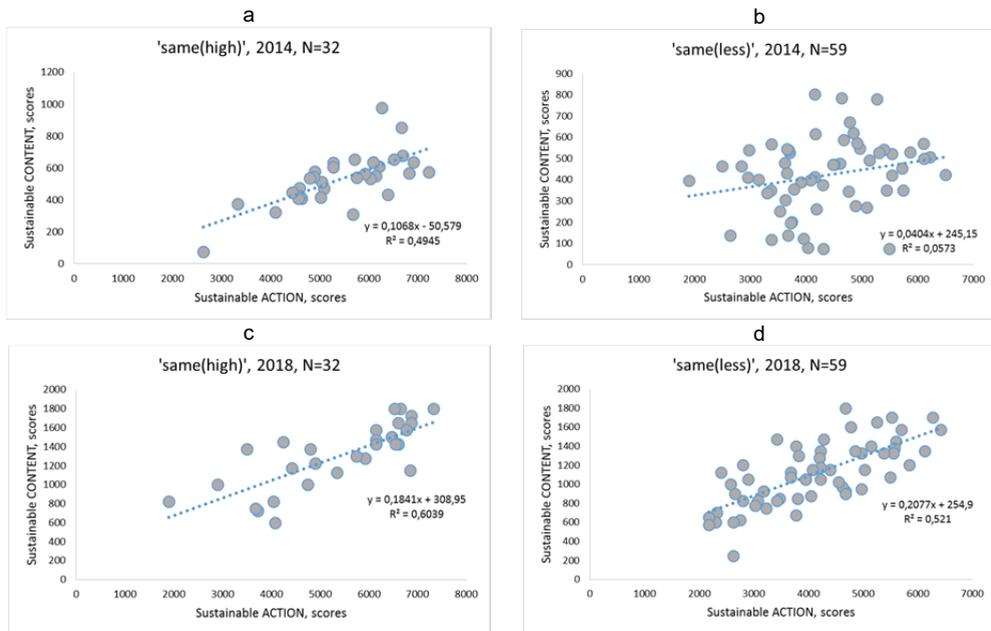


**Note:** 'all' – all universities that participate in UI GreenMetric World University Rankings in 2014 and in 2018 from economically high developed (high) and less developed (less) countries. 'Content' – includes UI GreenMetric World University Ranking category Education and Research. 'Action' – includes UI GreenMetric World University Rankings categories Setting and infrastructure, Energy and climate change, Waste, Water, Transportation.

**Figure 4:** Relationship between categories related to universities' 'sustainable action' and 'sustainable content' in all European Union universities included in UI GreenMetric World University Ranking in 2014, 2018

**Source:** elaborated by the author using UI GreenMetric World University Ranking (UI GreenMetric, 2014, 2018)

The relationship between variables is positive. Universities coordinate 'sustainable action' and 'sustainable content', which strengthen overall sustainable performance in both campus and society as a whole. In 2018, the positive relationship is observed in economically high and less developed countries. However, previously, in 2014, universities from economically less developed countries did not experience coordination between 'sustainable action' and 'sustainable content' (see Figure 4b). In 2018, the situation was significantly improved and universities from economically less developed countries similarly as universities from economically high developed countries work in parallel towards development of both categories, i.e. 'sustainable content' and 'sustainable action' (see Figure 4d).



**Note:** 'same' – universities that participate in UI GreenMetric World University Ranking in both 2014 and 2018 from economically high developed (high) and less developed (less) countries. 'Sustainable content' – includes UI GreenMetric World University Ranking category 'Education and Research'. 'Sustainable action' – includes UI GreenMetric World University Ranking categories 'Setting and Infrastructure', 'Energy and Climate Change', 'Waste', 'Water', 'Transportation'.

**Figure 5:** Relationship between categories related to universities' 'sustainable action' and 'sustainable content' in those European Union universities that are included in UI GreenMetric World University Ranking in both 2014 and 2018

**Source:** elaborated by the author using UI GreenMetric World University Ranking (UI GreenMetric, 2014, 2018)

Universities, which report about sustainable activities in 2014 and 2018 demonstrate similar tendency as observed for all European Union universities from UI GreenMetric World University Ranking. This tendency indicates that coordination of sustainable content and action become more significant and universities make serious efforts for improvements and better sustainable performance, which is especially observed in universities from economically less developed countries (see Figure 5).

## 5. Conclusions

- 1) Overall European Union universities' interest to participate in sustainable development increases, which may be evidenced by increasing number of participants in UI GreenMetric World University Ranking. However, at the same time, the number of participants from other world countries increases faster.
- 2) According to data available from UI GreenMetric World University Ranking (UI GreenMetric 2014; 2018), in European Union, universities from economically less developed countries participate and continue participation more actively than universities from economically high developed countries. Although, universities from economically high developed countries, in general, demonstrate higher scores and thus better performance

- across categories under research.
- 3) In European Union, universities from both economically high and less developed countries, in general, demonstrate focus on similar categories. For example, 'Energy and Climate Change' in 2014 and 'Waste' in 2018. Additionally, such categories as 'Setting and Infrastructure' and 'Education and Research' become more significant in practices in 2018 than in 2014 in both universities from economically high and less developed countries.
  - 4) Data on universities, which report about sustainable efforts in 2014 and 2018, demonstrate that universities in their sustainable efforts are not static and continue to improve practices and search for new accents.
  - 5) Complex approach to sustainability concept, which includes focus on both 'sustainable content' and 'sustainable action' become widespread across the cases under research. This must ensure promotion and continuity of sustainability concept across universities and society.
  - 6) Research findings highlight the necessity to stimulate universities intention to report about their sustainable efforts in long-term perspective. Continuing collection and analysis of the data may reduce fragmentariness of research findings, which, mainly, focus on good practices from the certain or several universities. Continuing quantitative analysis will provide understanding of common and different peculiarities and overall trends for better policy-making and promotion of sustainability concept across universities and society.

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