Introduction

Due to current linear economic structures and concepts, negative impacts such as resource insecurity have resulted in calls for alterations towards a circular economic model and subsequent economic, environmental and social shifts. (UNFCCC, 2015; United Nations, 2015). To assist in this process on a global scale, the 2015 United Nations Sustainable Development Goals (SDGs), or commonly referred to as the Global Goals were signed in September 2015, as a succession of the previous 2000–2015 Millennium Development Goals (MDGs). The SDGs are seventeen goals, with 169 related targets aimed at more sustainable practices universally, in a variety of areas and fields, including social, environmental and economic practices, and the transition to a more sustainable future via planetary protection, peace and prosperity (United Nations, 2015). The SDGs are also utilised as a tool to assist in the transition to a wider usage of evidence for policy makers via factual and numerical data through individual goal indicators.

As hubs of innovation towards numerous research and teaching areas, the role of Higher Education Institutions (HEI's) and their subsequent student led–organisations in expanding the development of the sustainability agenda is of paramount importance in solving many of the world's current and future challenges (Ellen MacArthur Foundation, 2013; Cleverdon *et al.*, 2017). However, in alignment with the pressures from HEI's, student–led organisations, such as student unions, have a joint duty in pressuring and developing the sustainability agenda within their respective institutions to create change (Tilbury, 2004). The unique position of student unions, as being both an integral part of – but external from – universities allows for an exclusive opportunity and challenge in assisting with the enhancement and development of sustainability–literate graduates (Sammalisto *et al.*, 2016; Dlouhá *et al.*, 2017). Additionally, the nature of working in partnership with and independently allows for differing levels of dissemination to students of the attributes required to understand the complex nature of sustainability (Kerr and Hart–Steffes, 2012; Brooks *et al.*, 2015a).

HEI's and student led–organisations have a duty of care and responsibility as the producers of the future (student) workforce as lifelong learners (European University Association, 2008), with the requirements of a future–proofed workforce allowing for an opportunity for all institutions and establishments to play a vital role in tackling the world's challenges. As students are the future change–makers and future leaders required to make these changes, a key driver of their future ambitions in relation to the SDGs are the student–led institutions which represent them.

Due to the overarching nature of Student led organisations, collaborative bodies are utilised to underpin organisations both on a local scale – such as via university–based student unions, as well as on a national and continental level. On a continental level, the European Union of Students (ESU) has been in operation since 1982, representing 46 National Student Unions from 39 countries, with general topics regarding students in their respective cultural, learning and societal environments (Hong, 2014). All members are "student–run, autonomous, representative and operate according to democratic principles." (ESU, 2018). In 2014, the ESU merged with the ESIB – The National Union of Students in Europe – to form its current adaptation, resulting in an umbrella organisation representing approximately 15 million students (ESU, 2018).

A current key policy aspect of the ESU is upholding a signatory commitment to the Bologna Accord of 1999, created from previous European discussions in creating a consistent European education system, such as the Sorbonne declaration of 1998 (EHEA, 1998). The Bologna process has ultimately created the European Higher Education Area. 29 Countries initially signed the Bologna Accord in 1999, with all but six countries in the European Cultural Convention of the Council of Europe being signatories to the agreement at present. All members of the EU are part of the Bologna process, with other external signatories such as UNESCO and the European Commission supporting and helping to implement this process. The importance of the Bologna Accord is far–reaching, particularly in relation to the overall education levels on a state by state basis – despite no formal link with EU legislation, resulting ultimately in a voluntary commitment. As such, the ESU has a key position in allowing for students to have a similar level of education, with it also being part of their vision statement.

As a result of the ever–changing nature of student demands, student led organisations (in conjunction with all organisations) have to be adaptable to respective changes and developments of given agendas and policy. A key example of a student–led organisation from a UK context is the National Union of Students (NUS). The NUS is a student organisation body founded in 1922, currently with approximately 600 student unions and 95 per cent of higher and further education unions in the UK, covering several strands of education providers, student ages and education levels (NUS, 2008). According to 2016–17 data, there were 2.32 million students studying within a UK Higher Education institution, with 162 higher education institutions in the UK in receipt of public funding (Universities UK, 2017). Additionally, there are a further 319 UK Further Education Colleges, educating and/or training 2.2 million people (Association of Colleges, 2018). The NUS also have devolved members in Scotland, Wales and Northern Ireland – with the latter being trilaterally ran with the Union of Students in Ireland (NUS–USI, Unknown).

Founded in 1922, the UK NUS has developed and altered over time (Brooks *et al.*, 2015a), with current values of collectivism, democracy and equality. The results of these values cover a wide range of areas applicable to the SDGs, alterable in relation to both local, national and international government policy relating to students. Furthermore, the overall complexion of the students running the NUS changes, via yearly elections both on a national NUS and local organisational level, thus providing opportunities for further alterations on an internal scale as both the NUS and local unions alter and develop (NUS, 2013; Brooks *et al.*, 2015a; Guan *et al.*, 2015).

The NUS also undertake several forms of high–level research into student matters, many of which cover the SDGs, including both Higher and Further education and funding, as well as the Welfare, Equality, Diversity and Liberation of both home and international students. In terms of specific sustainability research elements, the NUS, Environmental Association for Universities and Colleges (EAUC), University and College Union (UCU), the Association of Colleges (AOC) and the College Development Network (CDU) have undertaken research entitled "Sustainability in Education" since 2015, aimed at assessing the levels of sustainability across UK colleges and universities. (EAUC, *et al.* 2016; 2017). Also, research into sustainability skills of students via a national online survey, funded by the Higher Education Academy has helped to track and analyse expectations of learning and teaching of sustainability and sustainable development concepts from 2010/11–2015/16 (NUS, 2015; 2016). In terms of direct SDG research, the NUS have also released research entitled "Student Opinion – Sustainable Development Goals" highlighting student attitudes and perspectives of the SDGs – with 76% of (c.1550) students surveyed agreeing with the statement that Universities should actively lead and support achievement of the SDGs (NUS, 2018).

One of the NUS Initiatives directly attributable to sustainability concepts is the Dissertations for Good (DfG) programme. This is defined as is a unique programme of interaction between students, the NUS and organisations, to allow for the creation of student academic pieces of work, whilst also benefiting the organisations participating in the programme in their future work. The collaboration between the student and organisation is ultimately aimed at creating academic work which contributes towards economic, environmental and social sustainability (Croasdale, 2015).

This paper is undertaken under the Dissertations for Good programme, with the NUS being the primary host organisation – in conjunction as the founders of the programme itself – and have been a key stakeholder throughout this project. Due to the linkages within the HEI sector, the NUS are currently looking to extend the reach and depth of their already successful sustainability initiatives into wider markets outside of the UK, including, but not limited to the Green Impact and Responsible Futures accreditations, and are a key stakeholder through their Dissertations for Good Scheme. The UK NUS Head of Sustainability, Jamie Agombar was utilised as a direct NUS contact as a stakeholder throughout the process of this research, providing further research dissemination and knowledge regarding the initial research aims and objectives.

Despite efforts to categorise many of the UN SDGs, via initiatives and narrower elements such as Education for Sustainable Development (ESD), past academic research is primarily limited into specific business sectors or regions, as opposed to a global perspective – despite statistical and index knowledge (Hsu and Zomer, 2016; Allen *et al.*, 2017). On a global level, there is, at present no single defined, scientific ranking of each system on a state basis directly from the UN, potentially resulting in siloed approaches to multi–faceted issues and problems. Despite this, reference points and country profiles are being developed as data becomes available in relation to specific targets and continents. Rankings include both the overall level of success in adopting the SDGs, with several streams of reporting (UN, 2017a; UN 2017b), both on an incremental level, and in the overall scheme of the targets that make up the goals themselves. As the timeline of the SDGs continues voluntary reviews of data are becoming a key aspect of this step–change (UN, 2017b). Aside from the UN directly, organisations externally such as the Sustainable Development Solutions Network (SDSN) and Bertelsmann Stiftung have produced reports with an aim to assist in this process, such as the SDG Index and Dashboards Report of 2017 (SDSN and Bertelsmann Stiftung, 2017).

In terms of current index knowledge on a UK context, despite informed knowledge of reporting tools regarding sustainability, impact is currently limited, despite work to enhance knowledge transfer aspects of the goals (EAUC, 2016). Current governmental departments, such as the Office for National Statistics (ONS) has provided a UK–wide overview, however, this includes limited tailored analysis at present (ONS, 2016).

As such, this research will be linking and developing on an under–researched demographic in student unions, utilising a unique framework for potential future SDG related data inquiries, applicable to local, national and international outputs – to ultimately assist in the data–based level of the SDGs and the knowledge transfer of elements of work into the SDGs undertaken by student unions.

The aims and objectives of this project are as follows:

- To highlight the extent of current thinking on the SDG's and their target indicators within European Student Union (ESU) members after a period of implementation since their initial inception in 2015, in relation to the UK NUS.
    - Undertaken via searching on public web domain environments using pre–assigned, key terms, by utilising the UK NUS as a baseline, control knowledge source
- To highlight any areas of improvement required, primarily on a spatial aspect. Thus, allowing for stakeholders (NUS) to gain valuable information for future work.

Methods

The methodology of this project involves the creation of a unique, semi–automatic content analysis approach utilising ESU member nations and their respective web environments as a proxy for SDG levels of influence. The method was created from October 2017, with data collection over an eight–week period from December 2017–January 2018.

An initial list of 17 key terms were created as proxy indicators of progress towards the SDGs. These were both taken directly and adapted from information within the 2016 & 2017 progress towards the SDGs, in conjunction with the 2015 SDG targets and indicators (UN, 2015). These terms were subsequently spilt into Economic, Environmental, General and Social categories, defined by the researcher in question.

The overall research methodology was adapted from several previous works, including Jones and Lee's initial environment category in relation to global corporations' environmental management policies and procedures (Jones and Lee, 2007), which was later altered by Joseph and Taplin in 2012, in relation to work leading to the SDGs in assessing the influence of the previous Agenda 21 and Local Agenda plan formed at the Rio de Janeiro Earth Summit in 1992, in regard to Malaysian local government websites (Joseph and Taplin, 2012).

The key terms were selected to match as closely as possible with the SDGs, whilst also providing a tailored approach with minimal key term/term usage, to prevent potential overlap on non–SDG related issues.

Each key term has one or more specific SDG links, pre–selected by the researcher for results purposes against specific goals. However, there is an understanding that the SDGs (and as such, the key term/terms chosen) link to multiple goals in context – the key terms (where possible) have been selected as a proxy for one goal to aid in specific goal outputs, as shown by Table 1.

Table 1: Original and confirmed key term/terms prior to website data mining analysis, including overall section, specific wording and selected SDG application.

Section	Key terms/terms	Specific SDG Application/s
General	Sustainable Development	16 – Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
	Sustainable Development Goals **OR** SDGs	*
	Sustainability	*
Economic		
	Economic Productivity	8 – Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
	Capacity Building	12 – Ensure sustainable consumption and production patterns
	Sustainable Procurement	11 – Make cities and human settlements inclusive, safe, resilient and sustainable
	Sustainable Industrialisation	9 – Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
Environmental		
	Climate Change	13 – Take urgent action to combat climate change and its impacts
	Ecosystems	6 – Ensure availability and sustainable management of water and sanitation for all
	Environmental Management	14 – Conserve and sustainably use the oceans, seas and marine resources for sustainable development
	Environmental Impacts	15 – Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
	Renewable Energy	7 – Ensure access to affordable, reliable, sustainable and modern energy for all
Social		
	Equality	3 – Ensure healthy lives and promote well–being for all at all ages 5 – Achieve gender equality and empower all women and girls 10 – Reduce inequality within and among countries
	Global Citizenship	4 – Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
	Inclusivity	2 – End hunger, achieve food security and improved nutrition and promote sustainable agriculture
	Partnership Building	17 – Strengthen the means of implementation and revitalize the global partnership for sustainable development
	Resilience	1 – End poverty in all its forms everywhere

***Sustainability and Sustainable Development Goals/SDGs were perceived to have value across all goals**

Prior to testing, 7 of the initial 46 ESU member unions were discarded from testing due to a lack of web environment. This resulted in 39 unions, representing 33 nations applicable for full testing, as shown by Tables 2 and 3. In terms of non–applicable testers, this was based entirely off ESU member information, found within the ESU directory.

Figure 1: Visual Representation of all countries participating in study, as taken from Microsoft Excel 3D Map Creator, with Map Credits to; HERE, DSAT for MSFT, Microsoft, Navteq, Wikipedia, GeoNames

Table 2: Full ESU member listing of countries and respective unions participating in study.

Country of Union	ESU Union Acronym	Full Name of Union	Dates of Testing
Austria	OH	Austrian Students' Union	Jan 28–29th
Belarus	BSA	Belarusian Students' Association	Jan 28th
Belarus	BOSS	Brotherhood of Organizers of Student Self–Government	Jan 28th
Belgium	VVS	National Union of Students in Flanders	Jan 28th
Belgium	FEF	Federation of French Speaking Students	Jan 28th
Bulgaria	NASC	National Assembly of Students' Councils of Bulgaria	Jan 28th
Croatia		Croatian Student Council	Jan 28th
Cyprus	POFEN	Pancyprian Federation of Student Unions	Jan 28th
Czech Republic	SKRVS	Student Chamber of the Council of Higher Education Institutions	Jan 28th
Denmark	DSF	National Union of Students in Denmark	Jan 28th
Estonia	EUL	Federation of Estonian Student Unions	Jan 27th – Jan 28th
Finland	SYL	National Union of University Students in Finland	Jan 27th
Finland	SAMOK	University of Applied Sciences Students in Finland	Jan 27th
France	UNEF	National Students' Union of France	Jan 26th
France	FAGE	National Federation of Students' Associations	Jan 27th
Germany	FZS	Free Federation of Student Unions	Jan 26th
Hungary	HOOK	National Union of Students' in Hungary	Jan 26th
Iceland	LIS	National Union of Icelandic Students	Jan 26th
Ireland	USI	Union of Students in Ireland	Jan 26th
Israel	NUIS	National Union of Israeli Students	Jan 25th
Italy	UdU	University Students' Union	Jan 25th
Latvia	LSA	Student Union of Latvia	Jan 24th
Lithuania	LSS	Lithuanian National Union of Students	Jan 23rd
Luxembourg	UNEL	National Union of Students in Luxembourg	Jan 29th
Malta	KSU	University Students' Council	Jan 29th
Montenegro	SPUM	Student Parliament of the University of Montenegro	Jan 23rd
Netherlands	LSVB	Dutch Student Union	Jan 29th – Pilot Jan 14th
Netherlands	ISO	National Student Union	Jan 29th – Pilot Jan 14th

Norway	NSO	The National Union of Students in Norway	Jan 23rd
Poland	PSRP	Students' Parliament of the Republic of Poland	Jan 22nd
Romania	ANOSR	National Alliance of Student Organizations in Romania	Jan 29th
Serbia	SUS	Student Union of Serbia	Jan 29th
Serbia	SKONUS	Students' Conference of Serbian Universities	Jan 29th
Slovenia	SSU	Slovene Student Union	Jan 21st
Slovenia	SRVS	The Student Council for Higher Education	Jan 22nd
Spain	CREUP	Public Universities' Students Union	Jan 19th
Sweden	SFS	The Swedish National Union of Students	Jan 29th – Pilot Jan 14th
Switzerland	VSS–UNES–USU	Swiss Student Union	Jan 19th – Pilot, Jan 14th
UK:	NUS–UK	The National Union of Students of the United Kingdom	Jan 14th – Pilot, Dec 1st

Table 3: ESU Union and country members who did not participate in study.

Country of Union	Acronym of Union	Full Name of Union	Reason for Exclusion
Armenia	ANSA	The Armenian National Students' Association	No website environment available
Bosnia & Herzegovina	SURS	Students' Union Republic of Srpska	No website environment available
Bulgaria	UBS	UBS	No website environment available
Macedonia	NSUM	National Union of Students of Macedonia	No website environment available
Moldova	ASM	ASM	No website environment available
Portugal	FAIRe	Academic Federation for Information and External Representation	No website environment available
Ukraine	UAS	Ukrainian Association of Students	No website environment available

Firstly, a pilot test method in December 2017 was utilised to test the approach, with the NUS–UK, and three other, randomly selected national student unions – namely Sweden (SFS), Netherlands (ISO) and Netherlands (LSVB). This sample size was utilised as a 10% selection of all remaining ESU members, with the NUS–UK being used as a baseline control level of current knowledge, to compare unions against. This baseline was used to compare a standardised approach to multiple unions, despite potential website changes.

Websites were mined as defined in Figure 2, with the site link, presence/absence of key terms and subsequent frequency of key terms (where applicable) collected, both automatically utilising external Pearls Extension software, in conjunction with computer control prompts, assisted by manual human checking. The extent of the term usage in–text was formulated using a pre–defined depth of terms element, as defined below in Figure 2;

A key aspect of the method is the usage of the site levels, to allow an overall data collection of the entire site, despite differing site layouts. As described in Figure One, a maximum of five levels were used within this research, with the initial homepage becoming level one. This allowed for an in depth analysis of a given area of a website, without over–extending the research within multiple site directories. This was also used due to constraints of both time and resources, within the pre–defined limits of the research as noted below.

The following limits were also imposed for the pilot test:

- 190–page limit
- Must be based on direct, initial, visible site information only
    - E.g. No downloadable data
- No external sites to the union/organisation (e.g. advertising)
    - Subsidiary sites allowed linked directly to union
- A maximum of 5 level website depth elements
- Information limited from January 2014–Present day of testing (Dec 2017–Feb 2018), where dated on site.
- Data collection was to be undertaken utilising Google Translate where applicable, utilising the automatic website translations of the Google Chrome Browser

The pilot test provided a number of key alterations for the full testing element. Firstly, the introduction of the Google Chrome–Google Translate extension toolbar, as some webpages were not automatically translating through the Google Chrome browser. However, the translations utilising both techniques were confirmed to be identical in all sites used in the pilot tests in comparison to later testing. Furthermore, the pilot test also provided a prospective time frame to cover the remaining ESU member unions, as a result of the testing period required during the pilot itself

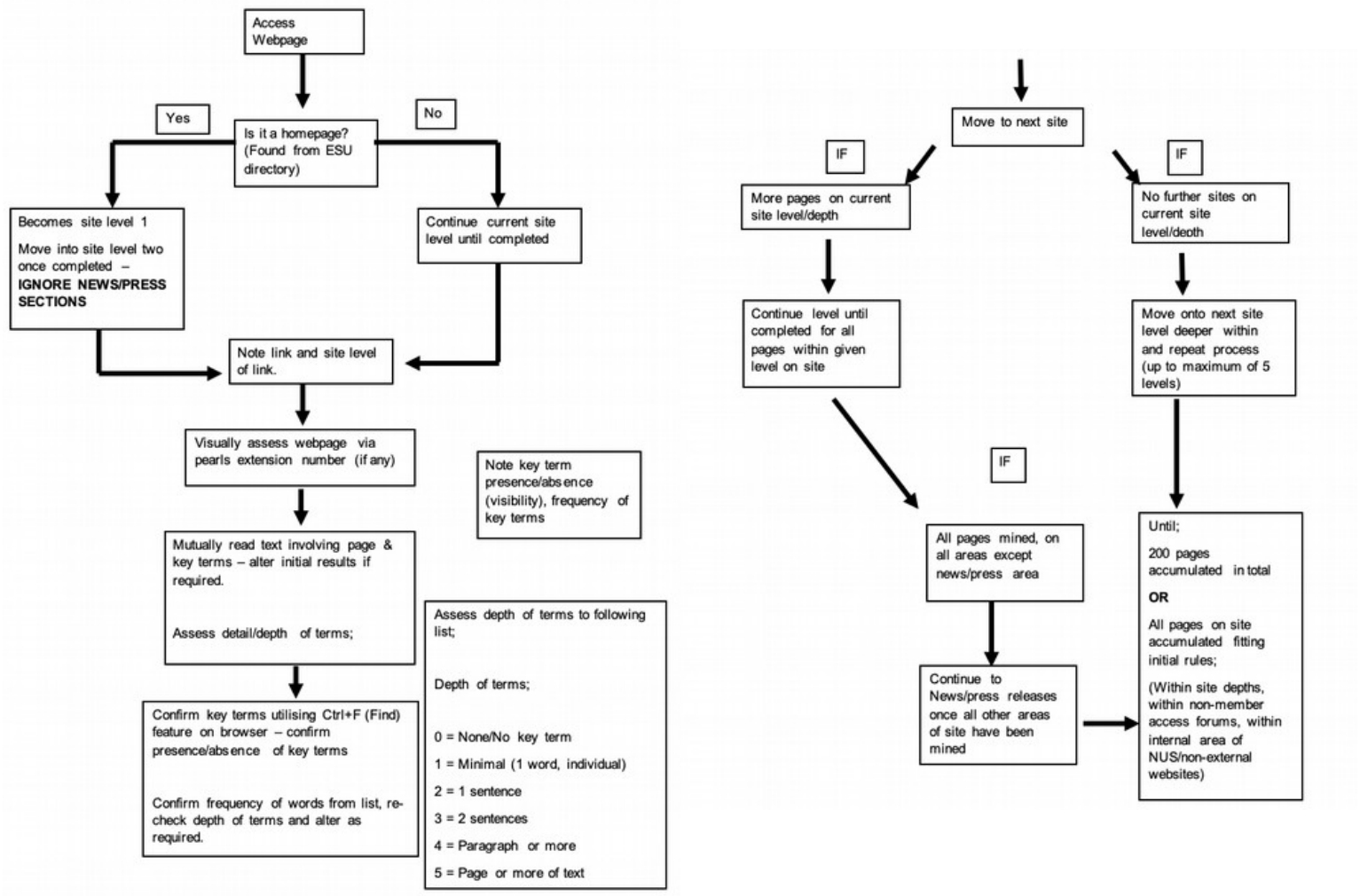


Figure 2: Dichotomous key showing chronological, methodological process of website data mining via initial processes and standardised processes, including depth of terms element.

For the full testing, page limits per union were lifted to 200 sites – with no further alterations to the pilot test method, providing a standardised confidence interval; when sites are determined as samples of a given website population – or the entire population, whereby all sites were covered prior to the 200–page limit.

Using Google's site operator tools, indexes for all ESU member sites were found, providing a maximum potential population of sites (c. 5,220 – NUS UK). Google Translate was utilised to assist this semi–automatic research, to assist in the translation of foreign languages, either automatically via the Google Chrome browser, or manually using a Google Chrome–Google Translate extension.

Results

In total, 39 unions from 33 countries were successfully analysed from an initial set of 46 unions (39 countries), as shown by Table Four, however, within this group, 24 unions failed to meet the 200–page upper limit, restricting the maximum webpage count from 7800 to 5142. Despite this, 20 unions, representing 17 countries had at least one key term (Figures 3 and 5), making up 52% percentage of all countries surveyed and 51% of all unions surveyed.

Of the 5142 key terms found, approximately 8% of pages contained at least one key term/term, with 935 total key terms found. Of these 935, as shown by Figure 4, 89% of all key term sites were located within the UK & Switzerland unions, creating 86% of all key terms found in totality. However, this trend alters with the number of specific key terms from the initial set – with the Swiss Union registering two key terms.

From the initial 17 key terms selected, 11 terms were found, as highlighted by Table 4 and Table 5, 75% of Economic key terms and 40% of social key terms/terms were not found in any site. Furthermore, there is a clear disparity between the types of terms used within unions who registered key terms. General category search terms were found by 16 of 20 unions, as opposed to 3 of 20, in the Economic and Environmental categories, and 4 of 20 in the Social Section. This is also shown by Figure 6, in which over 92% of individual key term occurrences counted were within the General category.

In terms of all key terms – regarding the overall depth of key terms/terms, the average is low at 1.56, residing between a singular word (1.0) and one sentence (2.0).

Table 4: Data variables regarding union page testing, key term frequency and depth of terms in relation to ESU Website environments.

Data Variable	Count/Percentage of Variable
Maximum Initial unions to test	46
Maximum number of countries to test	39
Data processed number of unions to tested	39
Data processed number of countries tested	33
Maximum number of sites mineable	7800
Number of Web Sites Mined	5142
Number of unions with Full site quota (200)	15
Number of Visible Key Term Pages	382
Number of Non–Visible Key Term Pages	4760
Total Percentage of Visible Key Term Pages	7.43%
Total Frequency of Key Term Found	935
Key Term Visibility Count	429
Maximum number of Key Terms from list	17

Number of Key Terms from List Found	11
Average Depth of Key Terms	1.56

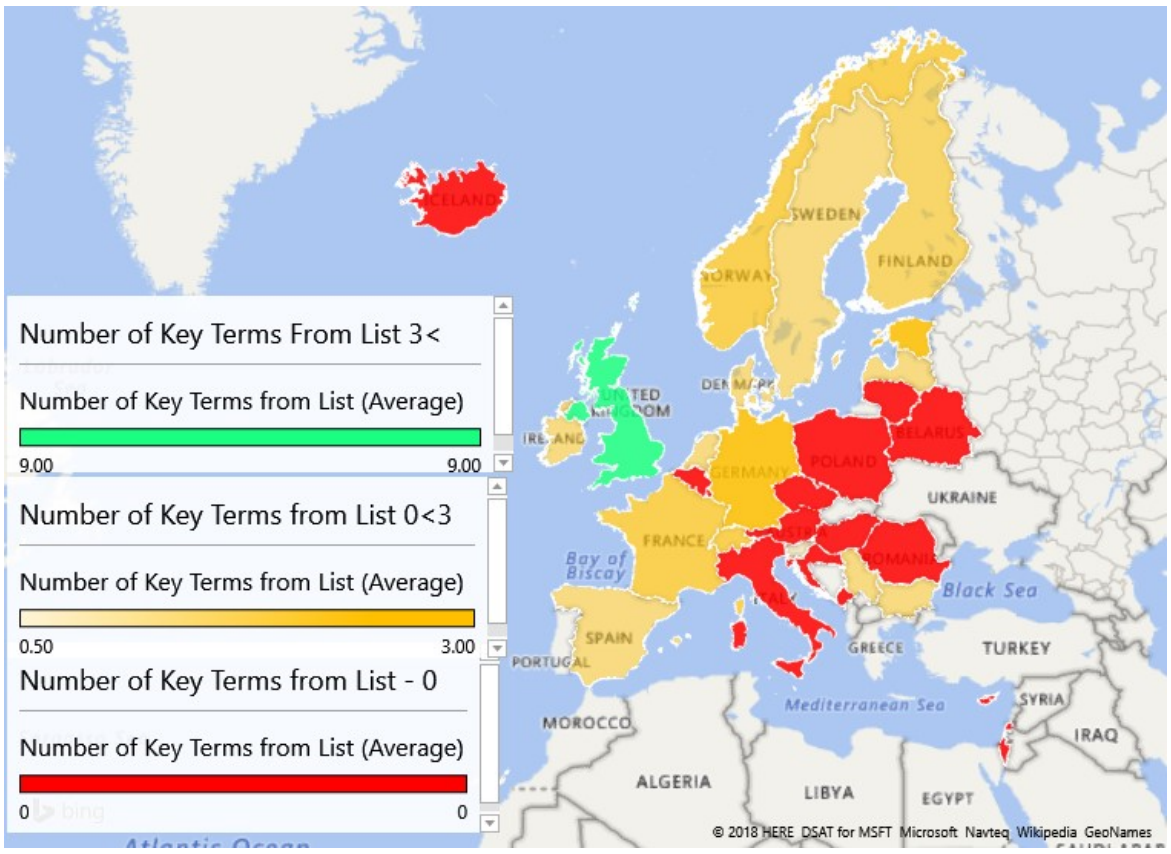


Figure 3: Visual Representation of all countries and respective number of Key Terms from list found per country participating in study, as taken from Microsoft Excel 3D Map Creator, with Map Credits to; HERE, DSAT for MSFT, Microsoft, Navteq, Wikipedia, GeoNames

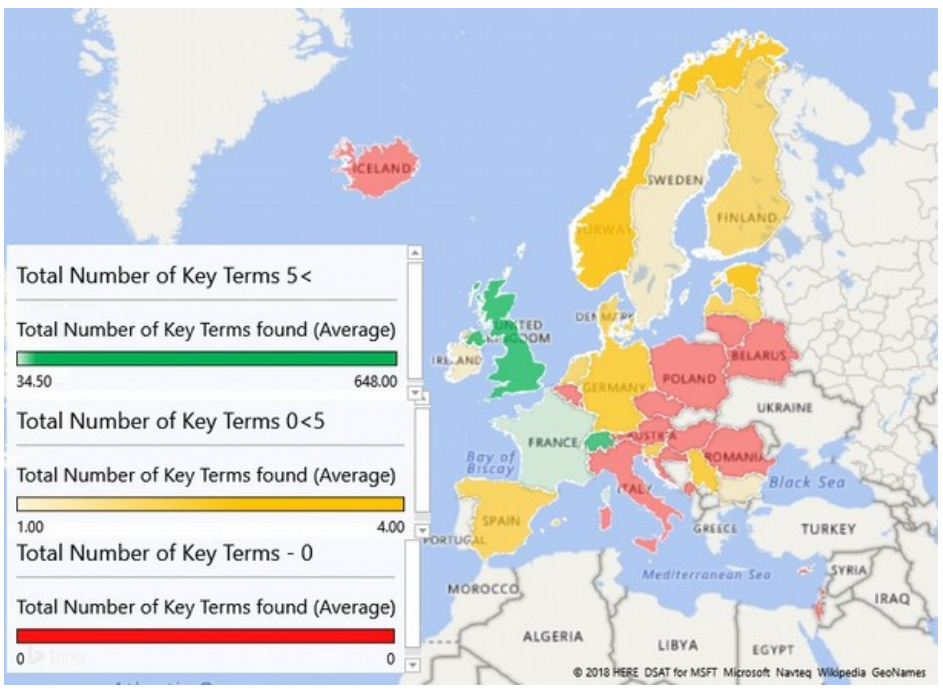


Figure 4: Visual Representation of all countries and respective number of Key Terms from list found per country participating in study, as taken from Microsoft Excel 3D Map Creator, with Map Credits to; HERE, DSAT for MSFT, Microsoft, Navteq, Wikipedia, GeoNames

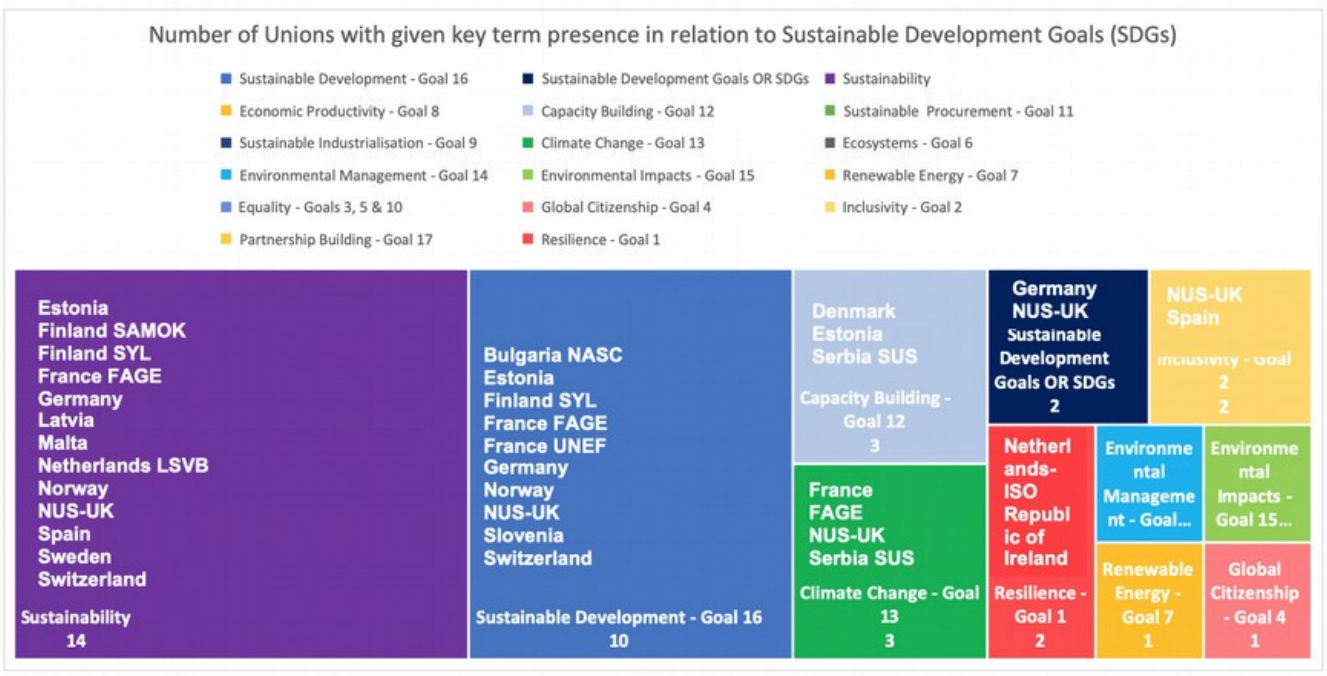


Figure 5: ESU member key term heirarchy chart showing presence/absence of key terms after testing of web environments.

*** All key terms in which there are one union present are attributable to the UK–NUS**

Table 5: Defined section of key terms and application towards the UN Sustainable Development Goals with respective union key term presence/absence.

Section	Key terms	Specific SDG Application/s	Unions with respective key term presence

General	Sustainable Development	16 – Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels	Bulgaria NASC Estonia Finland SYL France FAGE France UNEF Germany Norway NUS–UK Slovenia Switzerland
	Sustainable Development Goals **OR** SDGs	*	Germany NUS–UK
	Sustainability	*	Estonia Finland SAMOK Finland SYL France FAGE Germany Latvia Malta Netherlands LSVB Norway NUS–UK Spain Sweden Switzerland
Economic			
	Economic Productivity	8 – Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	N/A
	Capacity Building	12 – Ensure sustainable consumption and production patterns	Denmark Estonia Serbia SUS
	Sustainable Procurement	11 – Make cities and human settlements inclusive, safe, resilient and sustainable	N/A
	Sustainable Industrialisation	9 – Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	N/A
Environmental			
	Climate Change	13 – Take urgent action to combat climate change and its impacts	France FAGE NUS–UK Serbia SUS
	Ecosystems	6 – Ensure availability and sustainable management of water and sanitation for all	N/A
	Environmental Management	14 – Conserve and sustainably use the oceans, seas and marine resources for sustainable development	NUS–UK
	Environmental Impacts	15 – Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	NUS–UK
	Renewable Energy	7 – Ensure access to affordable, reliable, sustainable and modern energy for all	NUS–UK
Social			

	Equality	3 – Ensure healthy lives and promote well–being for all at all ages 5 – Achieve gender equality and empower all women and girls 10 – Reduce inequality within and among countries	N/A
	Global Citizenship	4 – Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all	NUS–UK
	Inclusivity	2 – End hunger, achieve food security and improved nutrition and promote sustainable agriculture	NUS–UK Spain
	Partnership Building	17 – Strengthen the means of implementation and revitalize the global partnership for sustainable development	N/A
	Resilience	1 – End poverty in all its forms everywhere	Netherlands ISO Republic of Ireland

Figure 6: Key term groupings and respective occurrences within webpages of ESU member nations.

Although there are several, traditional regions of Europe and the European Union (Central Intelligence Agency, 2018), this study will define regions as follows, with the United Kingdom and Republic of Ireland becoming a part of Western Europe in this instance, as shown by Figure 7 & Table 6 (Anon, 2012):

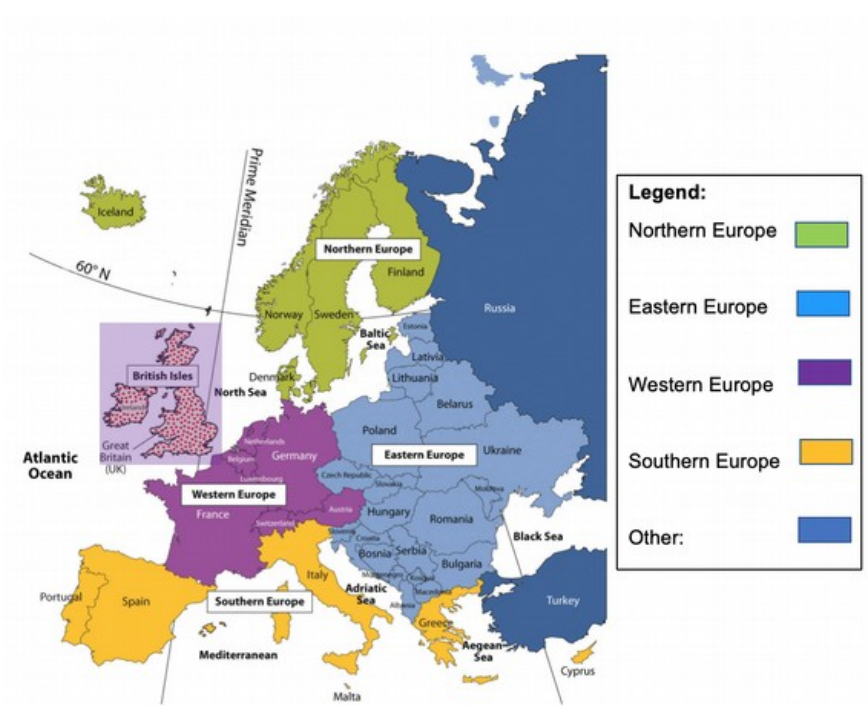


Figure 7: Map of Europe with defined geographical sections of study, including both ESU member and non–member states.

Table 6: Respective region groupings of all countries as defined by Figure 4.

Region	Northern Europe:	Eastern Europe	Western Europe	Southern Europe
Countries	Denmark	Albania	Austria	Greece
	Finland	Belarus	Belgium	
	Iceland	Bosnia	France	Italy
	Norway	Bulgaria	Germany	Israel (Missing on map?)
	Sweden	Croatia	Luxembourg	Malta
		Czech Republic	Netherlands	Portugal
		Estonia	Republic of Ireland	Spain
		Hungary	Switzerland	Cyprus
		Kosovo	United Kingdom	
		Latvia		
		Lithuania		
		Macedonia		
		Moldova		
		Montenegro		
		Poland		
		Romania		
		Serbia		

	Slovakia
	Slovenia
	Ukraine

Comparing European Countries within the areas defined within Table 6 and averaging their respective country results highlights several results, as shown by Figures 8, 9 and 10.

Firstly – as shown by Figure 8, Western Europe has a far higher frequency of Key term terms within their webpages. In conjunction with this, Western Europe also has a higher level of visible key term pages and visible pages applicable to this research, showing the level of key term spread throughout their respective webpages, as opposed to centralised or singular pages with large numbers of key terms.

With respect to the key terms, Western Europe has the highest total average number of specific key term terms, however – the average of both key terms in specific sections and as a total is low given the original terms totalled 17 (Figure 9). Furthermore, despite an increased number of key terms, the depth of terms is also the highest at 1.77, residing between a singular word and a sentence (Figure 10).

Splitting the key terms into groups highlights that specified regions are limited in their key term nature, with the Eastern and Western region covering 75% of sections, and 50% from all other regions, as shown by Table 7. All Regions covered at least one general term, however this was the only section in which all unions did so.

Table 7: Union regions and respective key term grouping presence and absence.

Region	General	Economic	Environmental	Social
Western	**Present**	**Absent**	**Present**	**Present**
Eastern	**Present**	**Present**	**Present**	**Absent**
Northern	**Present**	**Present**	**Absent**	**Absent**
Southern	**Present**	**Absent**	**Absent**	**Present**

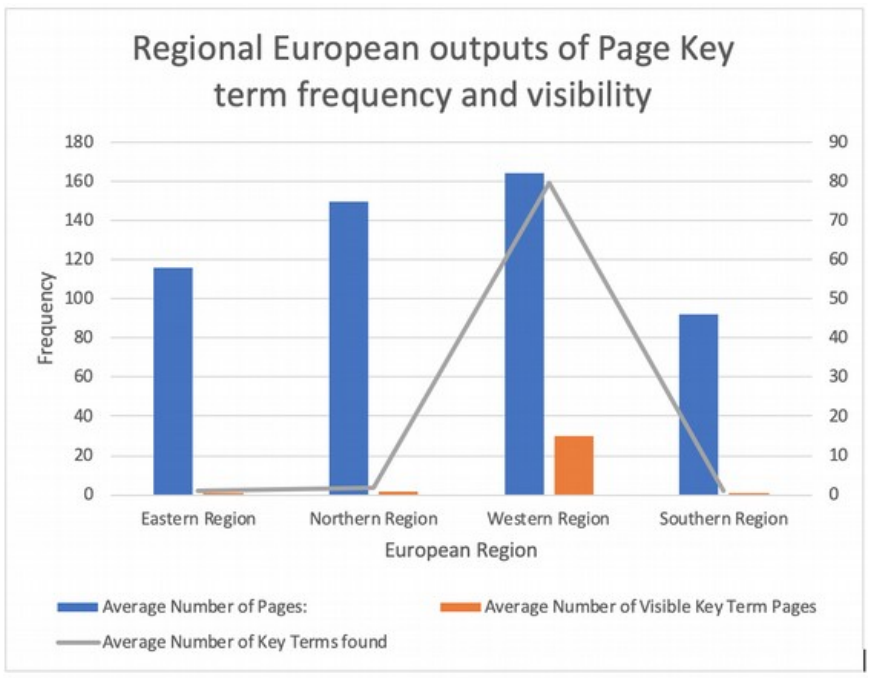


Figure 8: European Regions and respective page and key term outputs.

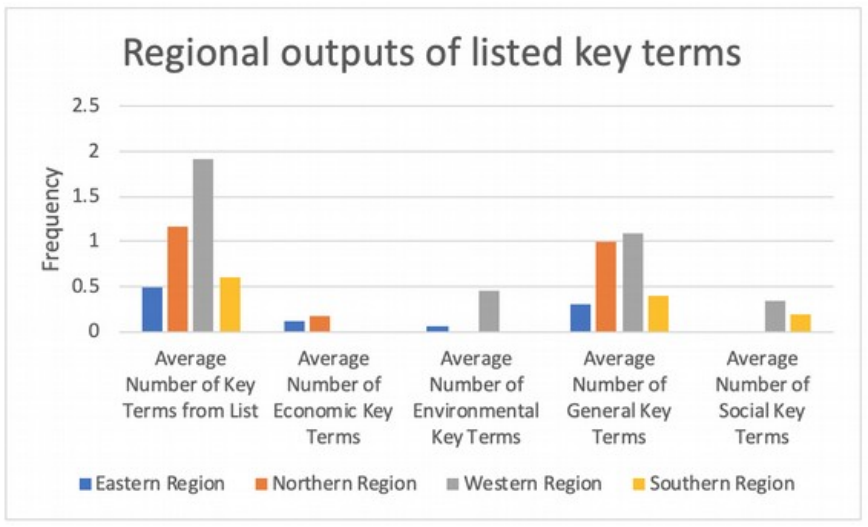


Figure 9: Key term groupings and respective occurrences within webpages of defined European regions.

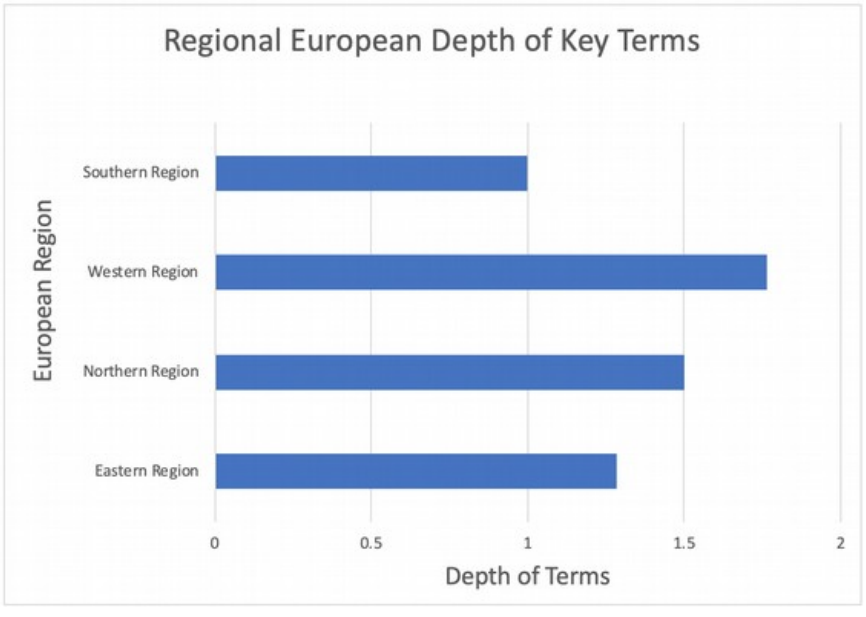


Figure 10: Depth of Terms levels within webpages of defined European regions.

However, on an internal region scale, there are differentials between countries; firstly, within Western Europe, there is a stark difference between the UK in relation to other countries, both in key term quantity – with approximately three times greater frequency than all other countries combined (Table 8) – and perceived quality, with the greatest number of individual key terms of any country (9), compared to a combined 12 for all other countries in this region (Figure 11). In conjunction, only eight out of twelve countries reached the assigned limit of 200 pages, with only two countries reaching a 100% key term presence rate – however the UK is the only country within this region to reach this with the full limit of 200 sites (Figure 12).

Table 8: Western Europe countries key term frequency and visibility statistics.

Union Country	Frequency of all key term terms	Percentage of Visible key term sites
UK	648	100
Netherlands LSVB	1	0.5
Netherlands ISO	2	1
Ireland	1	0.854700855
Germany	3	1
France UNEF	1	0.5
France FAGE	68	7
Switzerland	153	100

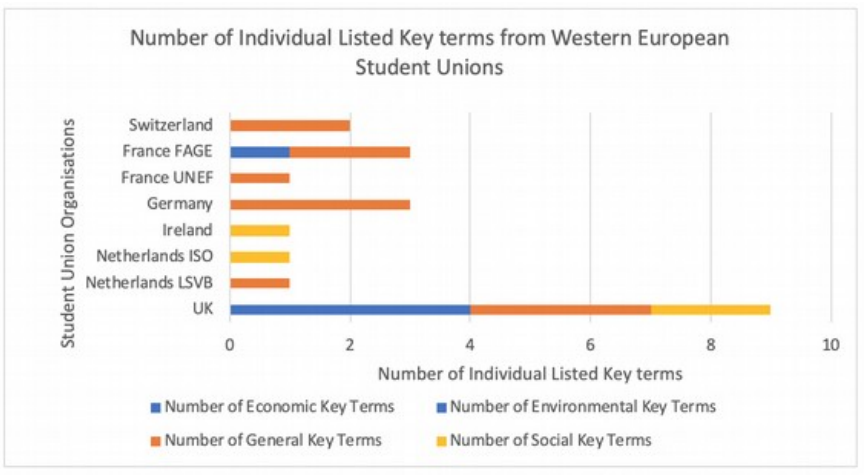


Figure 11: Western European countries individual key term presence groupings and respective occurrences within webpages.

***Four unions failed to register data – Belgium VVS, Belgium FEF, Austria & Luxembourg**

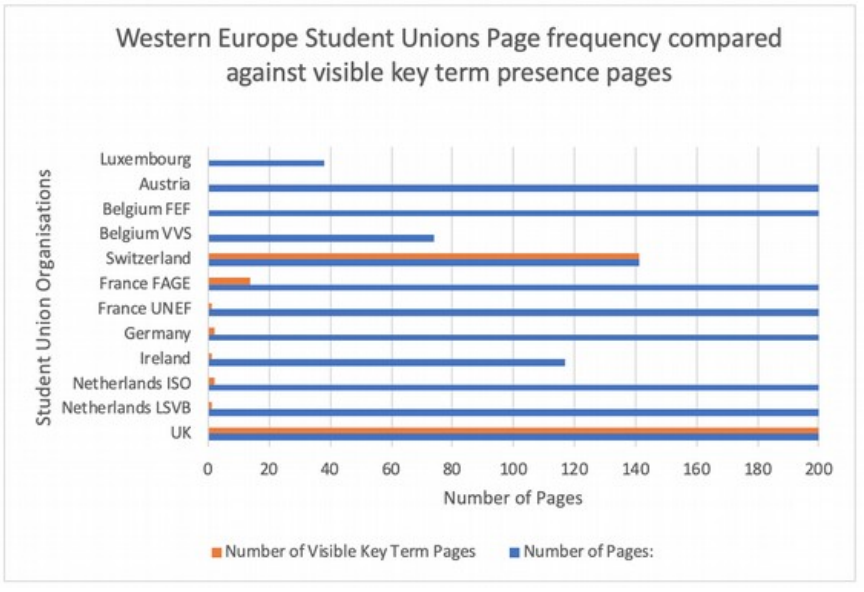


Figure 12: Western European page levels with respective key term page visibility on country by country basis.

In terms of the Southern region of Europe, there is a clear lack of both key term frequency and number of listed key term terms, with three for the entire region. Furthermore, only one of five countries registered the full quota of 200 sites, with two–thirds of unions failing to register over 50% of the page limit (Figures 13 and 14).

Regarding the number of listed key term terms, although two sections of the groupings were found, the general key term was the same for both unions (Sustainability, Table 5). Despite this, both Spain and Malta have a relatively high percentage of visible key term pages, at 2.85% (Table 8).

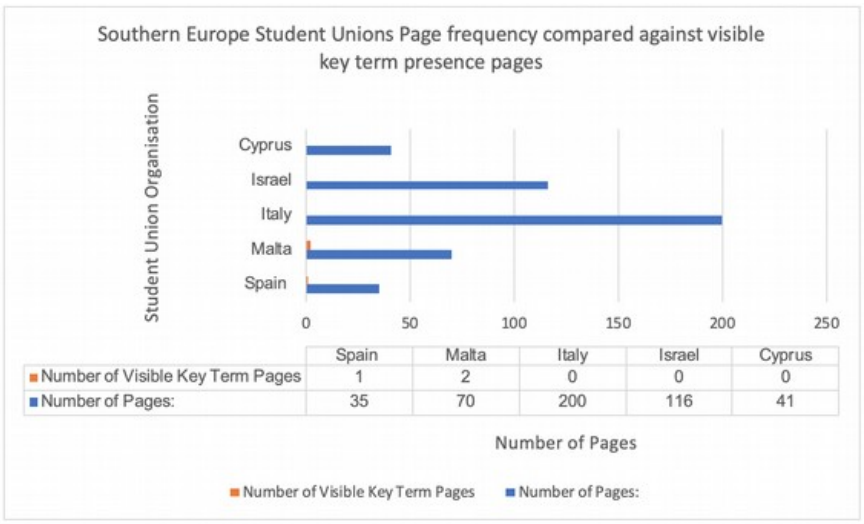


Figure 13: Southern European page levels with respective key term page visibility on country by country basis.

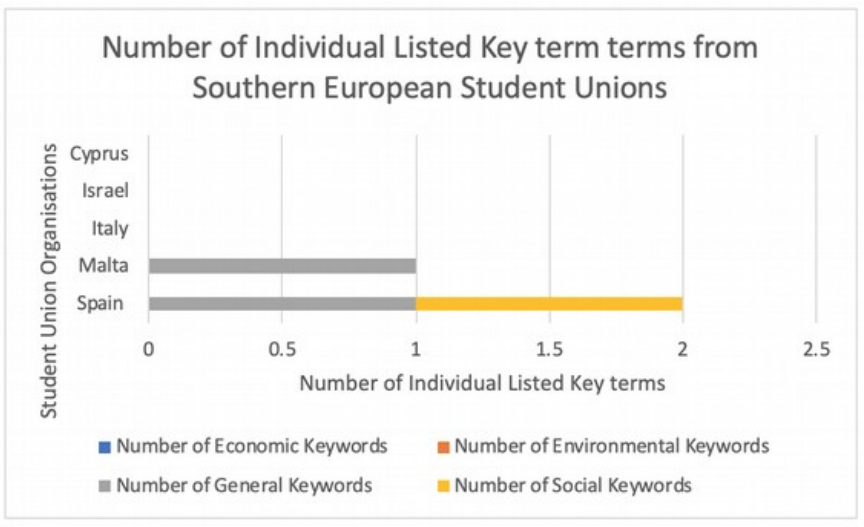


Figure 14: Southern European countries individual key term presence groupings and respective occurrences within webpages.

Table 8: Southern Europe countries key term frequency and visibility statistics.

Union (Country)	Number of Sites:	Number of Visible Key Term Pages	Number of Non–Visible Key Term Pages	Percentage of Visible Key Term Pages
Spain	35	1	34	2.857142857
Malta	70	2	68	2.857142857
Italy	200	0	200	0
Israel	116	0	116	0
Cyprus	41	0	41	0

In terms of the Northern Region, all but one union (Iceland) failed to register a key term, with 80% of unions registering a key term of some description, resulting in a total of 7 total key terms registered. But, this contained only three specific words (Capacity Building, Sustainable Development and Sustainability). In conjunction, Denmark was the only union to register a non–general key term, registering an economic term (Figure 15).

However, despite the listed number of key terms, page visibility levels were low (Figure 16), with a maximum frequency of three key terms for any of the Northern European unions, with a frequency of 9 terms from 897 sites, resulting in a percentage visibility of terms of 1%.

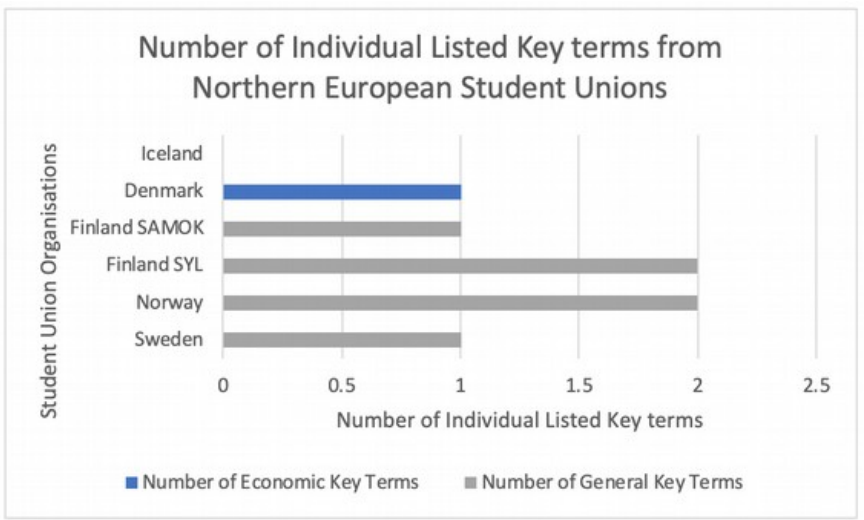


Figure 15: Northern European countries individual key term presence groupings and respective occurrences within webpages.

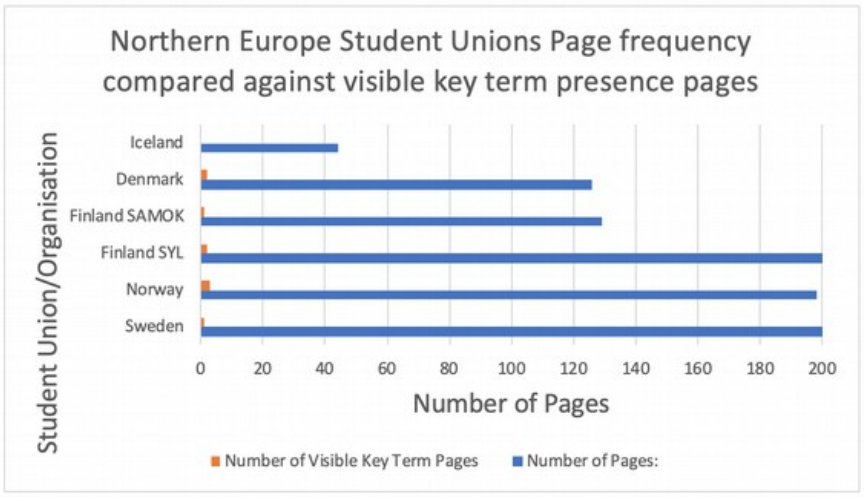


Figure 16: **Northern European page levels with respective key term page visibility on country by country basis.**

Within the Eastern Unions, 5 of 16 unions (31%) had a frequency of key terms above zero, however despite this, total key term frequency across the region was low, with a total frequency of 11 key terms and a high of four. Furthermore, only 25% of unions reached the full quota of pages, with an average page amount of 110 (Figure 17).

Despite the low total frequency of key terms and average mined pages, as shown by Figure 18, three groupings of key terms were successfully found during the data mining process, with no social key terms being visible. However, despite a total of 8 listed key terms, this represents only 5 terms from the original list of 17.

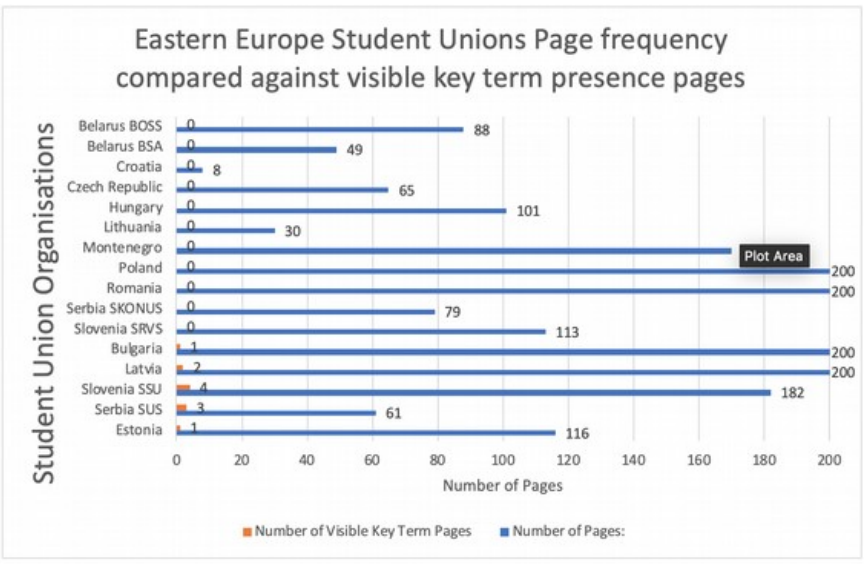


Figure 17: Eastern European page levels with respective key term page visibility on country by country basis.

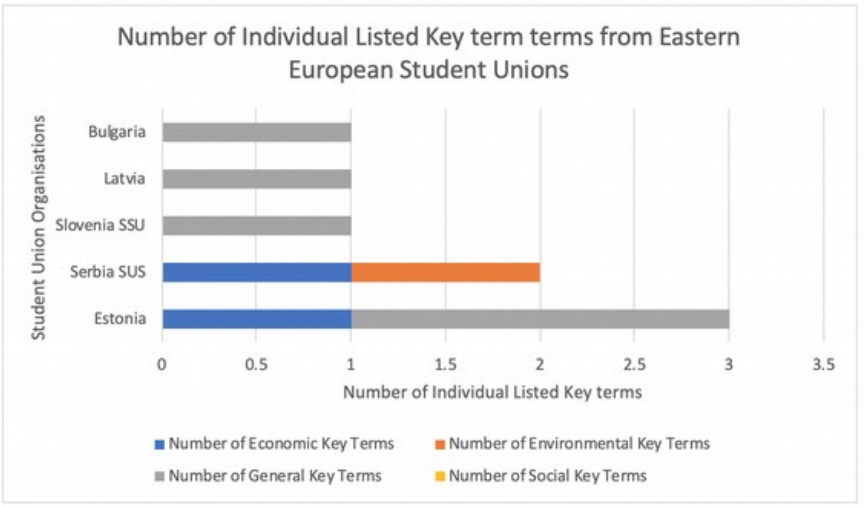


Figure 18: Eastern European countries individual key term presence groupings and respective occurrences within webpages.

Discussion

In terms of discussing the aforementioned results, the major questions related to this study involved the evaluation of the current thinking of the SDGs within ESU members, in relation to the UK NUS to highlight areas of improvement. This paper also aimed to assist in the overall creation and dissemination of existing (and additional) NUS research for future working practices. This was to be completed using an innovative content analysis method via data mining of ESU–member web environments, against pre–determined key terms and groupings – linked to specific SDGs as a proxy for SDG presence.

The major findings of the study displayed an overall low level of SDG visibility and key term presence between ESU members, from an initial test group of 39 unions and 33 countries respectively. Despite this, there was a large range of variation found between both regions and countries, highlighting both the current range of SDG applications and the specific nature of student demands in relation to the goals.

With the increased research globally into student power and student groups as stakeholders, the findings of this study are important in several aspects (Klemenčič, 2014; Pinheiro, 2015). The findings may help to assist in the development of SDG dissemination throughout national unions on both an individual and collective European scale – leading to policy and progressive change, currently through the ESU. Past research by Gibson (2006), Hoogmartens *et al.* (2014), Duić *et al.* (2015), Sala *et al.* (2015) and Rodríguez–Serrano *et al.* (2017), has highlighted both a need for interaction and interlinkage within sustainability assessment systems, in creating original, and refining existing techniques – applicable within specific sectors and on larger viewpoints, such as businesses (Global Reporting Initiative, 2015). This paper interlinks with this past research and expands the current knowledge in exploring an under–researched demographic, to provide a baseline assessment for future alteration and development in the extension of this research area.

Regarding the continental importance of the findings, a concentrated development of 89% of all key term sites and 86% of key term frequency was located within the UK & Switzerland unions. This concentrated development could be classed as unions of best practice, particularly regarding the 100% webpage visibility of key terms. However, the low average individual key term listings and low depth of terms results also highlight a need for a greater understanding beyond the general terms outlined, and specifically, a greater understanding and dissemination of the underlying – and underpinning – principles of sustainability and sustainable development. Past research by Hansmann *et al.*, 2012 specifically dealt with the relevant professional contributions of Environmental Science graduates' professional outputs towards sustainable development and Swiss national sustainability policy. As such, this paper's results highlight the interlinking nature of the Swiss (and other) national students unions current levels and future perspectives in assisting with assessing and preparing future professionals in all fields of study of sustainability issues.

Linking the overall results to current elements of work within national unions, the ESU's unique positioning as the European connection for all national student unions within this region, as well as a lead on the Bologna Process is vitally important to this study. The ability of the ESU to work in unique partnerships on behalf and in conjunction with students in both research and teaching provides a unique opportunity for development of the sustainability agenda itself on a nation by nation basis (Klemenčič, 2015; Bovill and Felten, 2016; Healy *et al.*, 2017).

With students' perspectives shifting regarding the quality and value of education, amplified levels of consumerism have been created, in an ever–competitive global ranking system of businesses, HEI's and student unions. As sustainability begins to become a key differentiator in these sectors, increased importance of these issues is important to attract both students and future graduates within nations (Jungblut *et al.*, 2014; Brooks *et al.*, 2016; Global Tolerance, 2015; PWC, 2015). Developing this within a business context, research by RobecoSam in 2017 focused on Environmental, Social, and Governance (ESG) profiles within evolving and developed economies. This was completed via a defined framework to assist in the overall knowledge of investment within given countries, providing a frame of reference – in much the same vein as this research – thus expanding the current knowledge base (RobecoSam, 2017). As such, this paper has importance in showcasing the varying nature of current support and drive from student unions in developing both an education and skillset which may assist them in future.

In response to this, HEI's and student–led organisations are beginning to adapt and develop to student needs regarding sustainable development (Gough and Longhurst, 2016, Willats *et al.*, 2017; Gough and Longhurst, 2017). This is occurring via elements such as the SDG Accord created by the EAUC (EAUC, 2017), described as a response by the college and university sector to convert the SDGs – with global partner organisations such as the NUS – into educational institutions via knowledge sharing. Furthermore, by pledging to assist one another in the goals, whilst using the accord as a commitment to share SDG progress in wider contexts, such as the UN High Level Political Forum, linking with past UN emphasis on collaboration (Gustafsson and Ivner, 2018). Despite this, at the time of writing, globally – only two Students Union members have signed the SDG accord (both from the UK), showing a current limitation and future research opportunity into the current level of engagement with union officers on a local level – as opposed to the unions themselves.

On a regional basis, this paper's results begin to magnify specific countries efforts toward the dissemination of the SDGs. From a Western European perspective, the variation between both the number of pages available for analysis and number of visible pages gives an insight into the current stage of unions themselves, and how some unions are more developed than others, both within an SDG and a general sense. As the SDGs were altered, as opposed to their preceding Millennium Development Goals in creating targets without differential between developing and developed countries with varying research opinions (Kenny, 2015; Kumar *et al.*, 2016; Dannecker, 2018), it is integral to highlight variation both external to, and within unions from an organisational basis.

In terms of Southern Europe, the results show an alteration, with less developed unions (by page count), such as Maltese and Spanish unions having key term presence against Italian unions whereby no key term presence was found – yet a full website quota was obtained. This variation could be due to several factors external to this study, such as current economic and social constraints, on both a union and national scale and/or current student attitudes and key union topics over the 2014–2018 website range. As an extension to this, work by RobecoSam in their 2017 country ranking update (Figure 19) directly highlighted Italy as having "inadequate literacy levels and a pronounced job–skill mismatch" (RoboSam 2017, pg 9).

Figure 19: RobecoSam Data showing overall Environmental, Social and Governance (ESG) results in relation to emerging and income markets – as taken from http://www.robecosam.com/images/Country_Ranking_Update_May_2017.pdf

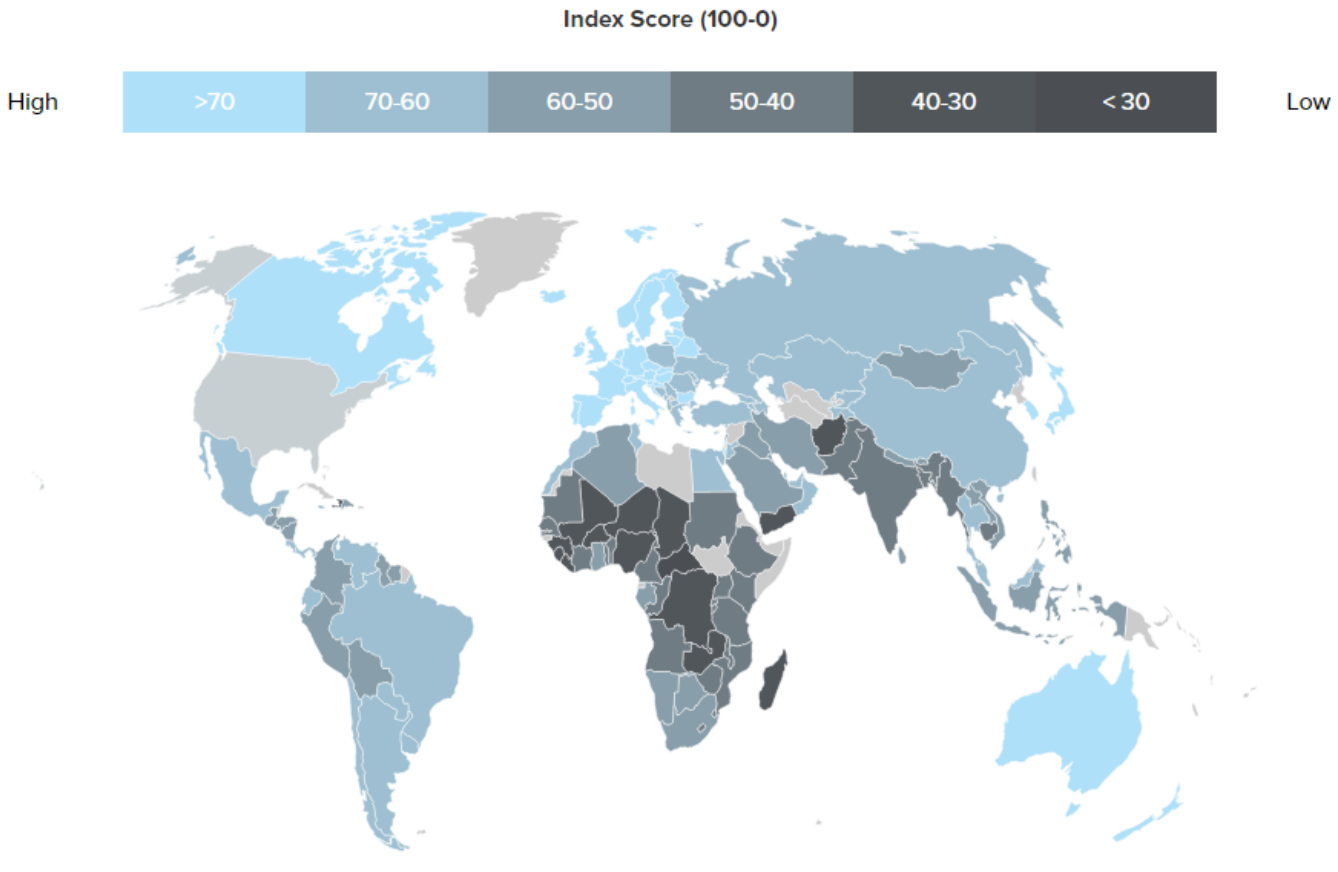
In terms of northern European countries, despite a higher than average number of total key terms utilised across all unions (seven), the frequency of key terms (nine), overall number of key terms and sections utilised (three and two respectively) help to illustrate the complexity of measuring the unions themselves – and how several other factors must be taken in account. Despite these low Figures, as Table 8 shows, according to the 2017 SDG Index, undertaken by Bertelsmann Stiftung and the UN Sustainable Development Solutions Network – in terms of average level of progress to achieving the SDGs – all the countries defined within the Northern region in this study rank within the top ten countries in the world – with four of the top five positions. Furthermore, Western European countries filled the remaining top ten positions, potentially highlighting a disparity between overall country levels, against student–led organisation levels. Despite this, all countries have at least one below average element within the index, indicating a need to become more balanced and rounded in approaches to the SDGs (SDSN and Bertelsmann Stiftung, 2017).

Despite covering three sections of key terms in this study, Eastern European countries rank lower in the SDSN and Bertelsmann Stiftung SDG index, in comparison with the rest of Europe (Figure 20) – linking in with poor levels of webpage data in terms of pages applicable to study and overall development of web environments. As per all countries, this variation may be resulting from several, external factors beyond the scope of this paper, enabling future research outputs on a localised or country–based level.

Table 9: SDSN and Bertelsmann Stiftung, 2017 SDG Index top twenty rankings on global country scale, as taken from. https://www.weforum.org/agenda/2017/03/countries–achieving–un–sustainable–development–goals–fastest/

Table 1. The SDG Index

Rank	Country	Score
1	Sweden	84.5
2	Denmark	83.9
3	Norway	82.3
4	Finland	81.0
5	Switzerland	80.9
6	Germany	80.5
7	Austria	79.1
8	Netherlands	78.9
9	Iceland	78.4
10	United Kingdom	78.1
11	France	77.9
12	Belgium	77.4
13	Canada	76.8
14	Ireland	76.7
15	Czech Republic	76.7
16	Luxembourg	76.7
17	Slovenia	76.6
18	Japan	75.0
19	Singapore	74.6
20	Australia	74.5



Index Score (100-0)
High
>70
70-60
60-50
50-40
40-30
< 30
Low

Figure 20: SDSN and Bertelsmann Stiftung 2017 SDG Index Figure highlighting current state of European Countries in relation to overall scores compared to global outputs, as taken from https://www.weforum.org/agenda/2017/03/countries–achieving–un–sustainable–development–goals–fastest/

In terms of the limitations of this research in totality, there was both a pre and post pilot understanding of limits imposed on the research – with many of the limits found during the pilot study – hence its inclusion within this paper in showing the development of the methodological process. This was primarily due to the type of environments being studied, and the potential alterations of website environments as time progresses (Hewson and Stewart, 2016). Since web environments are ever–changing and are cases of continual development – from a research data perspective, limits on data collection were imposed due to research time and resource constraints, with an understanding of potential samples of much larger, broader websites. The usage of site depths, and the overall combing of each level provided a level of similarity to each website testing, despite altering website layouts and designs. However, an appreciation of differing websites designs allowed for some webpages to be omitted, particularly if deeper than the maximum site depth.

Also, in relation to the given data mined, despite original news sections being omitted prior to the rest of the website (to allow an overall view point), in many cases where the 200–page limit was reached, some news or press sections were unable to be tested in any format – due to the level of data external to the news/press sections. Although automatic testing via programs such as RapidMiner has been utilised in both direct research and print texts, (Kotu and Deshpande, 2015; Ristoski *et al.*, 2015; Gentile *et al.*, 2016; Sharma and Ramani, 2017) it was rejected in this case due to inaccuracies, resource constraints and an inability to define given aspects of data results – such as the depth of terms outputs. However, this research could be completed in an altered method, in comparison to this research, by utilising a wholly automatic method, contrasted with the semi–automatic method used in this research, over all web pages as opposed to a limited number, where applicable.

Furthermore, software limitations are present within this study. Despite Google translate being available on all platforms – the utilised Pearls extensions at present is an external application, within the Google Chrome browser, resulting in a potential need for the Google Chrome browser in this instance – despite similar programs within other browser operators. In terms of Google Translate itself, several research elements have highlighted both its effectiveness in research in non–native languages and its respective fallibilities in terms of accuracy (Mathers *et al.*, 2010; De Noordhout *et al.*, 2014; Jiménez–Crespo, 2018). Research by York *et al.* (2018) highlighted this issue in relation to policy documents and the usage of Google Translate "did not have sufficient functionality to support a uniform approach" (York *et al.*, 2018, pg 2200), resulting in a trade–off in countries in which English may be a non–native language. Furthermore, York also stated that "Although the requirement for English language websites may be a potential source of bias, a sampling strategy without uniformity also risks the creation of bias" (York *et al.*, 2018, pg 2200). As such, despite using Google Translate in this instance, the strategy of website data–mining has been as kept as uniform as possible via a pre–defined website mining approach across all data collected. However, future research into this area may require native speakers/writers of a given language, to help mitigate and lower potential bias.

For countries that do not contain a website environment, although they have been discounted from this research – it is not a reflection on their work in totality towards the SDGs, or within their education establishments, and may not reflect their true standard of SDG research. This also applies to non–fully formed websites, in which information may have been completed on a ground level, but not yet been placed within web environments for a variety of reasons. Although this is a limitation of the research, current omissions to this study provide a scope for future research to help quantify and compare omitted countries, either through their web environments or otherwise.

There is an understanding that the researcher impacts the methodology in numerous ways and that reflexivity of the researcher's role is required (Finlay, 2002; Berger, 2013). Firstly, regarding key terms – the researcher's personal worldview and previous academic experience (or lack thereof) impacts both the terms selected, the category that the terms were placed in and the SDG applications selected to each term (Berger, 2013). There may also be errors during the methodological process, such as missing pages or key term information. This has been minimised by the utilisation of automatic software and computer control prompts to confirm both manual and automatic readings, to help account for textual reflexivity (Macbeth, 2001). Furthermore, the depth of terms reading is a judgement made by the researcher, both in terms of the level of data by visual representation on a given webpage, in conjunction with usage of word processing software to confirm given sentences/paragraph/page levels of text – in relation to lowered font sizes, for example. However, technological usage such as google translate – despite its effectiveness particularly with a wide range of languages can result in errors, thus potentially impacting on key term presence/absence (Agarwal *et al.*, 2011; Rensburg *et al.*, 2012).

Due to an understanding that the research can potentially be affected by altering perceptions and emotions (Gemignani, 2011) during the data collection period as unions are evaluated and subconsciously compared against one another, it is important to have this research validated by external researchers utilising this model – however, despite this not occurring in this study at present, all precautions have been taken to provide defined, measurable criteria prior to any testing taking place.

Although no further future testing was completed after the pilot and full testing, a key aspect of this research would be the future outputs of testing after a given period of time, to improve the validity of this research, whilst also allowing future development within unions to be plotted over time. This may allow for future formations of rankings as highlighted and utilised in aforementioned studies (SDSN and Bertelsmann Stiftung, 2017; RoboSam 2017). Furthermore, as this research has been undertaken by one person, a key current limit of this research would be the need for independent, external testing to help validate the results of this paper. This would also be a future extension of this project, given resource extensions.

Finally, despite the fact that this study is focusing on European countries within the ESU, the methodological approach can be extended (with added resource and development) to include countries both internal and external to Europe, with similar research questions within both a larger and smaller context. This may allow for both a higher level of depth within specified countries or areas, in conjunction with a higher breadth of countries in terms of scale – for example globally, assisting in future SDG information and dissemination.

Conclusions

To conclude, this research has aimed to address a knowledge gap in relation to student unions, in relation to global issues and challenges on a sustainable development context, via the UN Sustainable Development Goals. This research has been undertaken with stakeholders from the UK National Union of Students, under the Dissertations for Good Programme (Croasdale, 2015).

Due to the increasing numbers of students attached to a student's union, this research is important in relation to enabling students to gain the skills required to deal with both current and future global challenges. As such, HEI's and affiliated unions have a duty of care in guiding and providing students with opportunities applicable to sustainability, compounded by current, changing student demands related to both businesses and future prospects. Furthermore, student unions on a local and national scale are in a unique position to enable change institutionally, by working both in partnership and against HEI's (Brooks, 2015).

This research has utilised the UN Sustainable Development Goals framework in conjunction with this paper's method to assess the current levels of SDG presence and absence within national student unions, to ultimately increase the knowledge transfer elements of the SDGs, linking with current international Universities and College responses, such as the SDG Accord (EAUC, 2017).

This research has been undertaken using an innovative method, by assessing ESU National Union development via their web environments. The SDGs have been linked within pre–determined keywords to assess the given presence or absence of the SDGs within the aforementioned environments.

This methodological approach resulted in many levels of variation across the measures tested, both on a continental and national scale, as well as between nations with multiple student unions, highlighting the different nature of unions in development against the UK–NUS and other national student unions. Notably, 20 unions, representing 17 countries had at least one key term. However, 89% of all key term sites were located within the UK & Switzerland unions, creating 86% of all key terms found in totality. Furthermore, from the initial 17 key terms selected, 11 terms were found, although the UK–NUS were the only union to register four of these eleven terms and nine in totality, with the next highest count being three key terms.

Although this methodological approach is limited, both in design and technological inputs as a semi–automatic approach, in conjunction with limits on the researcher, there is a large scope for extension of this research. This method can be applied to differing countries, with a view to future implementation (with additional resources) across all sites within a given web environment, utilising native speakers and/or by using automatic data mining processes. Although multiple testing has not been completed during this research, it is a future extension of this work, allowing for interlinks with current research elements of already published country rankings. (SDSN and Bertelsmann Stiftung, 2017).

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