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## **Green curricula? An analysis of environmentally oriented curricula in economics and business administration at German institutions of higher education**

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**Abstract:** The concept of sustainability is becoming more and more important as a result of growing environmental problems. Education is an essential premise to promote this concept, especially at universities and other institutions of higher education, because that is where future managers gain their education. Sustainability-oriented teaching and research is not only important in natural science, but also in economics and business administration. Companies use nature for their production by utilising resources and emitting pollutants and waste and therefore have a responsibility to respect ecological and social objectives.

The purpose of this paper is to give a broad overview of the importance of environmental education in economics and business administration classes at German universities and universities of applied sciences. We have intensively analysed specific course subjects to show how to implement the concept of sustainability in economics and business courses.

**Keywords:** business administration; corporate environmental management; economics; education; environmentally oriented curricula; sustainable development; university; university of applied sciences.

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Univ.-Prof. Dr. Matthias Kramer is Dean of the Faculty of Business Administration and Economics at the IHI Zittau (Germany). Since 1995 he has been Professor and Chair of Business Administration, especially in the field of Controlling and Environmental Management. From 1995–2002 he was Vice-Chancellor of the IHI Zittau, between 1998 and 2002 he was a member of the Price Committee for Quality Management in Saxony and since 2002 he has been Vice-Chancellor and co-founder of the German-Polish Institute for Environmental Management at the Polonia University in Czestochowa (Poland). From 1991–1995 he was Vice-Coordinator for Environmental Research and responsible for Ecological Management Projects at the Federal German Environmental Foundation in Osnabrück (Germany).

## 1 Institutions of higher education and sustainability

Environmental issues cannot be removed from public debate since the book *Limits to Growth* [1] showed that human economic activities change the natural environment (climate change, resource degradation, decreasing biodiversity or water shortage) endangering the future of mankind.

The final report of the Brundtland Commission on Environment and Development ‘Our Common Future’ presented the concept of sustainable development. “Sustainable development is a development that meets the needs of the present generations without compromising the possibility of future generations to meet their own needs.” [2]

In this sense, sustainability embodies the identification and activation of a mode of economic activity and human coexistence with nature that equally follows economic, social and ecological criteria of stability and development. The report focuses on an intra- and intergenerational equality. The common objective is simultaneously to ensure human survival and a good, free and meaningful life for an appropriate number of generations.

The Enquete Commission ‘Protection of mankind and environment’ of the German Parliament (Enquete-Kommission ‘Schutz des Menschen und der Umwelt’ des Deutschen Bundestages) derived the following rules from that report [3]:

- the rate of using renewable resources must be equal to the rate of their regeneration, the rate of using non-renewable resources must be equal to the rate of substituting them
- respecting the carrying capacity of nature
- uncontrollable risks shall be avoided
- considering the dimension ‘time’.

That means that technology has to be socially acceptable and ecologically compatible. It is central to this perception of sustainability that material and social processes are seen in their interaction. Neither can material processes, such as resource depletion, be isolated from social consequences, nor social processes such as overpopulation be separated from the view of total material consumption.

Therefore, it can hardly be denied that sustainable development requires substantial changes on the level of individual human behaviour especially in industrialised countries.

We have to rethink many areas of human behaviour in order to implement the rules of sustainability. Environmentally friendly behaviour is strongly related to knowledge of the environment and to a positive environmental consciousness or attitude as it is shown in many psychological, pedagogic and environmental policy research studies [4]. In this context, environmental education, especially environmental research and teaching at universities and other institutions of higher education, has gained importance. Future leaders in politics, business and science are educated being confronted with the sustainability concept. Therefore, at universities and other institutions of higher education is a need for top priority for:

- individual and social learning on a cognitive and emotional level to understand and increase the awareness of environmental and social problems
- trust in, communication, and cooperation with other scientists in collective action to solve environmental, social and economic problems
- deliberation, participation and self-organisation in order to gain economic and political influence for promoting sustainable development.

This importance is also reflected in Agenda 21 [5] submitted by 170 States at the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro in 1992. This action program for the 21st century contains a chapter on science for sustainable development (chapter 35) as well as a chapter on promoting education, public awareness and training (chapter 36). The Copernicus-Charter [6], the university charter for sustainable development, mainly promotes the implementation of Agenda 21 at the level of universities and institutions of higher education. Many European universities have signed the Copernicus Charter committing themselves to ecological and ethical actions. It contains a 10-point action program for implementing sustainability at universities:

- institutional commitment
- environmental ethics
- education of university employees
- programs in environmental education
- dissemination of knowledge
- interdisciplinarity
- networking
- partnerships
- continuing education programs
- technology transfer.

It is shown that this charter not only includes ecological aspects in teaching and researching, but also structural/organisational and social targets. This is a very wide program in order to reach and interest as many people as possible to build a better future.

## **2 Ecological orientation in economics and business administration – need for analysis**

If we compare the implementation of the Copernicus Charter in different countries, we find that the implementation of the above-mentioned aspects in university curricula strongly depends on the development of the social and political environment in each country. In Germany, environmental consciousness has developed since the 1970s and consolidates at a high level now [7]. An active debate of environmental aspects in society and politics has accompanied this development. The media has frequently reported environmental issues. Environmental organisations and social movements surged. Now, not only does the program of the green party contain environmental issues, but also the programs of nearly all other parties. Environmental policies and laws have developed. Due to this development in Germany, measures for technical environmental protection and environmental management in many enterprises have partly reduced the pressure on the environment. Many ecologically damaged sites have been restored and repaired rather quickly, even if long-term solutions for a harmonious relationship between productive economic systems, satisfying social systems and functioning eco-systems are still in short supply.

Nevertheless, this long-term development also reflects in the institutions of higher education, despite visible deficits. We can find many activities aimed at the ecological transformation of German universities and universities of applied sciences.

Ecological aspects have been included in teaching at universities by establishing environmental specialisations, compulsory and optional courses not only in the traditional environmentally oriented natural sciences and engineering faculties, but also in the faculties of economics and business administration (e.g. since 1990, a Scientific Commission ‘Corporate Environmental Management’ has existed within the Association of University Professors of Management (Wissenschaftliche Kommission ‘Umweltwirtschaft’ im Verband der Hochschullehrer für Betriebswirtschaft e.V.), [8]. There are also several sustainability-oriented professorships (several junior professorships are planned at the moment) in natural science and engineering faculties, as well as in economics and business administration.

Environmentally oriented research increases. Often it is partly supported by some foundations – for example the German Foundation for the Environment (Deutsche Bundesstiftung Umwelt).

In research for sustainability also the development of environmentally oriented networks and study circles plays a role. There are networks for professors, for people following university lecturing qualifications, for researchers in PhD programs and for students [9].

Last but not least, some universities and universities of applied sciences are working successfully on the implementation of corporate environmental management systems according to EMAS or ISO 14000 ff [10].

Due to this wide range of activities we need a focus. In our understanding, economics and corporate business administration are especially important in the discussion of the sustainability concept because economic activities overuse resources and thus cause environmental problems. That is why firms are responsible regarding the sustainable use of nature and regarding intra- and intergenerational equality.

In our analysis we investigate how environmental issues are included in the teaching of economics and business administration at German universities and institutions of higher education. We take into consideration the above-described developments at universities and the necessity to also (or especially) integrate ecological aspects into the teaching programs of universities. Despite the fact that aspects of environmentally oriented management are considered in many other subjects such as natural sciences, engineering, agriculture, social or administrative sciences, we limit our analysis to economic majors at German universities, universities of applied sciences and comprehensive universities.

We try to analyse as many institutions of higher education in Germany as possible but this paper is not meant to be comprehensive. We offer a rough overview of the situation in some German institutions of higher education. Our aim is to highlight ways to promote environmental education in university education. That is why we want to find out, to what degree (length, breadth and depth) environmental aspects are integrated into economic programs at German universities. We ask, if

- 1 existing programs have been widened by including ecological aspects and if yes, to what degree
- 2 new ecological programs have been developed.

We will develop criteria by which it can be investigated how far sustainability is regarded as an interdisciplinary challenge according to the Copernicus Charter.

### **3 Criteria for our investigation**

According to the aim of our research we are especially interested in

- 1 the importance of environmental education in the courses as an indicator of the importance of courses
- 2 their specific contents in order to define the strengths and weaknesses of environmental education in economics and business administration in Germany.

Therefore, we can derive the following two categories for our investigation: (see Table 1).

The first category comprises general information about the university such as name, address and the organisational embeddedness of the environmental education in the courses. The second category comprises specific course contents which are investigated using the presented catalogue of criteria. The focus of our investigation is on economics content but we consider the interdisciplinary ideas asking for aspects of policy, law, natural sciences, techniques, economics and behavioural sciences [11].

**Table 1** Criteria for our investigation

<i>Criteria</i>	<i>Operationalised by:</i>
General information about the university	<ul style="list-style-type: none"> <li>• Name</li> <li>• Faculty, Institutes</li> <li>• Programs</li> <li>• Integration</li> <li>• Subjects with environmental orientation</li> <li>• Type of subject</li> </ul>
Contents	<ul style="list-style-type: none"> <li>• Environmental policy</li> <li>• Environmental law</li> <li>• Economy – ecology relationship</li> <li>• Strategic environmental management</li> <li>• Environmental management instruments (Input-output-analysis; LCA; environmental cost accounting; EMAS; Eco controlling; Eco-labelling)</li> <li>• Corporate environmental management systems (EMAS, ISO 14000 ff)</li> <li>• Environmental technology (waste; energy; water; soil; air)</li> <li>• Environmental informatics</li> <li>• Operational environmental management (products; procurement; production; marketing; logistics; organisation; human resource management; finance)</li> <li>• Environmental psychology</li> <li>• Global environmental problems</li> <li>• Local environmental problems</li> <li>• International orientation (Czech Republic-Germany; Poland-Germany; Western Europe; Eastern Europe; USA)</li> </ul>

*Source:* International Graduate School Zittau.

#### 4 Database

We investigated universities, universities of applied sciences and comprehensive universities from all over Germany in order to obtain the most comprehensive overview possible about environmental education in economics at universities. We were not able to investigate all universities; that is why we limited our analysis. Due to a high number of universities with environmental education in their curricula (above 170 degrees outside economics and business administration at universities and 120 degrees outside economics and business administration at universities of applied sciences [12]) and our limited research capacities, we limited our analysis to graduate programs in economics and business administration at German universities, universities of applied sciences and

comprehensive universities. We know that aspects of environmentally oriented management are considered in numerous other programs such as natural sciences, engineering sciences, social sciences, administrative sciences and agriculture.

We obtained the necessary data in three steps (see Table 2)

- 1 Our database (a survey of universities with environmentally oriented curricula in economics and business administration) stems from the 'Guide to German Universities' [13] and the 'Study Guide Environmental Protection' [14]. We requested information brochures and leaflets from the universities. The information was entered and processed in an Access-database [15]. Further, we sent a questionnaire to the members of the Scientific Commission 'Corporate Environmental Management', which exists within the Association of University Professors of Management, asking for their activities. Not all criteria of the database could be fulfilled using these data. Therefore, we had to complement our data.
- 2 We complemented the data by using internet information on the respective universities. Many universities did not provide official information about their study programs at that time. Besides this, development in this area is very dynamic. Therefore we used all additional information about all universities, universities of applied sciences and comprehensive universities provided by experts in order to use up-to-date information.
- 3 After we completely analysed all accessible information using the database criteria, we sent the information to the respective universities. The universities corrected and completed the data.

In total, we processed information about 66 German institutions of higher education between the summer term 1998 and the winter term 1999/00. At these universities and universities of applied sciences, 88 environmentally-oriented subjects/courses are taught. These subjects are offered in 104 graduate and undergraduate programs [16]. Due to the dynamic development in the area of environmental education at universities, we know that our database is not complete. Therefore we would encourage our readers to inform us about changes and new developments.

**Table 2** Data origin

<i>Data basis</i>
<ul style="list-style-type: none"> <li>• Guide to German Universities, 56th edition</li> <li>• Study Guide Environmental Protection</li> <li>• Scientific Commission 'Corporate Environmental Management' exists within the Association of University Professors of Management</li> </ul>
<i>Complementing the data</i>
<ul style="list-style-type: none"> <li>• Internet</li> </ul>
<i>Evaluation of data</i>
<ul style="list-style-type: none"> <li>• Universities corrected the data</li> </ul>

*Source:* International Graduate School Zittau.

We can show tendencies due to the high number of investigated universities and universities of applied sciences despite the fact that our analysis does not include all of them. These tendencies are supported by the information material about the content of the courses and their integration into the study program. We refrained from quantifying the corresponding time and conducting an analysis of details. We know that our analysis is subjective to a certain degree for those reasons. We tried to minimise this subjectivity by a final check of all information which the universities offered.

## **5 Results – the state of education in environmental management at German universities**

We evaluate our data regarding the type of education, the integration of environmental protection into the study program and the specific content of courses. From these results we derive strengths and weaknesses.

### *Results – type of university*

We can build categories for the classification of universities using different parameters. Firstly, we used the categories: university, comprehensive university and university of applied sciences. We investigated 44 universities, 3 comprehensive universities and 19 universities of applied sciences constituting the 66 institutes of higher education in our database (see Table 3). We can observe an ecological orientation in more theoretically-oriented university studies as well as in more practically-oriented university studies. In our investigation we find more environmentally oriented courses at universities than at universities of applied sciences [17].

### *Evaluation of general information about the universities*

We obtained a very differentiated picture regarding inclusion into the programs and the dimension of ecologically oriented education in economics and business administration despite the fact that we limited our analysis to the integration of environmental issues into graduate and undergraduate programs in economics and business administration.

Environmental issues are included in teaching different graduate programs (see Table 4). Environmental aspects are included in all economic programs such as business administration, economics, business engineering and business informatics. We observe that business administration is the focus with 57 courses. Moreover, universities and universities of applied sciences have built up specialised ecologically oriented programs such as economics with an ecological focus, environmental and business administration and environmental and economic law. Some universities and universities of applied sciences have established interdisciplinary programs in which economic aspects have the same importance as other disciplines. Therefore these programs are open for students from other disciplines than environmental studies.



**Table 3** Differentiation of universities

<i>Type of university</i>	<i>Name</i>	<i>Name (continued)</i>	<i>Number</i>
University	Carl von Ossietzky Universität Oldenburg	TU Clausthal	44
	Europa-Universität Viadrina	TU Darmstadt	
	Frankfurt/O.	TU Dresden	
	Fernuniversität Hagen	TU Ilmenau	
	FU Berlin	Universität Augsburg	
	Heinrich Heine Universität Düsseldorf	Universität Bayreuth	
	Internationales Hochschulinstitut Zittau	Universität Bremen	
	Johann Wolfgang Goethe-Universität Frankfurt/Main	Universität der Bundeswehr Hamburg	
	Johannes-Gutenberg-Universität Mainz	Universität des Saarlandes	
	Justus-Liebig-Universität Gießen	Universität Greifswald	
	Ludwig-Maximilians-Universität München	Universität Hamburg	
	Martin-Luther-Universität Halle-Wittenberg	Universität Hannover	
	Otto-Friedrich Universität Bamberg	Universität Kaiserslautern	
	Otto-von-Guericke-Universität Magdeburg	Universität Karlsruhe	
	Philipps-Universität Marburg	Universität Leipzig	
	Private Universität Witten-Herdecke	Universität Lüneburg	
	Ruhr-Universität Bochum	Universität Mannheim	
	Ruprecht-Karl-Universität Heidelberg	Universität Potsdam	
	TU Berlin	Universität Rostock	
	TU Chemnitz	Universität Stuttgart	
		Universität Trier	
		Universität zu Köln	
		Westfälische Wilhelms-Universität Münster	
		Handelshochschule Leipzig	
		RWTH Aachen	
Comprehensive universities	Universität Gesamthochschule Kassel	Universität	3
	Universität Gesamthochschule Essen	Gesamthochschule Siegen	
Universities of applied sciences	Europa Fachhochschule Fresenius Idstein	Fachhochschule Trier (Birkenfeld)	19
	Fachhochschule Bingen	Fachhochschule	
	Fachhochschule Fulda	Wilhelmshaven	
	Fachhochschule für Wirtschaft Berlin	FHTW Berlin	
	Fachhochschule Harz	Georg-Simon-Ohm	
	Fachhochschule Koblenz	Fachhochschule Nürnberg	
	Fachhochschule Mainz	Hochschule Anhalt (FH)	
	Fachhochschule Merseburg	Hochschule für Technik und	
	Fachhochschule Nürtingen	Wirtschaft Mittweida (FH)	
	Fachhochschule Pforzheim	HTW Dresden (FH)	
	Fachhochschule Schmalkalden	HTWS Zittau/Görlitz (FH)	

Source: International Graduate School Zittau.

**Table 4** Programs

<i>Programs</i>
<ul style="list-style-type: none"> <li>• Business administration (57)</li> <li>• Economics (14)</li> <li>• Business engineering (8)</li> <li>• Economics and business administration (7)</li> <li>• Interdisciplinary (4)</li> <li>• Technically oriented business administration (3)</li> <li>• Business informatics (3)</li> <li>• Environmental studies (2)</li> <li>• Economics focusing on ecology (1)</li> <li>• Environmental protection (1)</li> <li>• Environmentally oriented business administration (1)</li> <li>• Economic and environmental law (1)</li> <li>• Economic pedagogy (1)</li> </ul>

*Source:* International Graduate School Zittau.

Not only the programs but also the different courses and their importance in the study programs show the broad range of environmentally oriented education in economics. In our investigation we differentiated between graduate programs, specialisation (within the framework of a specialisation in business administration or a compulsory course), compulsory courses (binding for all students) and optional subjects (additional courses) (see Table 5).

We can see at the most universities and universities of applied sciences ecological aspects are integrated into economics and business administration as specialisation (55%). That means that the ecological specialisation is in addition to other 'classical' subjects and can be choiced by interested students voluntarily. But compulsory courses also are important (17%). Environmental issues are also dealt with in compulsory subjects (24%). Specialised programs for environmental education in economics exist, but represent a minority (4%).

### *Results: content of studies*

For a more detailed analysis of the environmentally oriented subjects we evaluated the specific content (see Table 6).

All requested relevant issues within the context of economics/ecology are covered. The subjects focus on the relationship between economics and ecology, operational environmental management, environmental policy and environmental management instruments. Less frequent subjects such as environmental informatics and environmental psychology are considered in a rather limited way. These results can be seen in the classification of the courses using their content as the main criteria (see Table 7).

**Table 5** Type of specialisation

<i>Type of study</i>		
<i>Type of specialisation</i>	<i>Number of universities and universities of applied sciences</i>	
Programs	4	
Specialisation	48	
Compulsory subject	15	
Optional subject	21	
Total	88	

  

<i>Name</i>	<i>University/University of applied sciences (*)</i>	<i>Number</i>
<i>Program</i>		
Economics focusing on ecology	Carl v. Ossietzky Universität Oldenburg (1)	1
Environmentally oriented business administration	Fachhochschule Trier (Birkenfeld) (19)	1
Environmental sciences	Universität Lüneburg (79)	1
Business and environmental law	Fachhochschule Trier (Birkenfeld) (20)	1
<i>Specialisation (major)</i>		
Corporate Environmental Management	Carl v. Ossietzky Universität Oldenburg (2)	22
	Europa-Fachhochschule Fresenius Idstein (6)	
	Fachhochschule für Wirtschaft Berlin (10)	
	Fachhochschule Koblenz (12)	
	Fachhochschule Mainz (13)	
	Fachhochschule Merseburg (14), (15)	
	Fachhochschule Nürtingen (16)	
	Fachhochschule Pforzheim (17)	
	Fachhochschule Schmalkalden (18)	
	Georg-Simon-Ohm Fachhochschule Nürnberg (25)	
	Heinrich-Heine-Universität Düsseldorf (27)	
	Hochschule Anhalt (FH) (28)	
	Martin-Luther-Universität Halle-Wittenberg (43)	
	RWTH Aachen (54)	
	Universität Gesamthochschule Essen (69)	
	Universität Gesamthochschule Siegen (71)	
	Universität Leipzig (78)	
	Universität Lüneburg (80)	
	Universität Stuttgart (85)	
	TU Dresden (59)	
	Westfälische Wilhelms-Universität Münster (35)	

**Table 5** Type of specialisation (continued)

<i>Name</i>	<i>University/University of applied sciences (*)</i>	<i>Number</i>
<i>Specialisation (major)</i>		
Industrial economics/production	Carl v. Ossietzky Universität Oldenburg (3) Johann-Wolfgang-Goethe-Universität Frankfurt/Main (38) Johannes-Gutenberg-Universität Mainz (40) Ruhr-Universität Bochum (49) TU Dresden (60) Universität Bremen (65)	6
Marketing	Carl v. Ossietzky Universität Oldenburg (5) TU Chemnitz (56) Universität Hannover (74)	3
Environmental economics/ecological economics	Fernuniversität Hagen (22) TU Berlin (55) Universität Augsburg (62)	3
Environmental and resource economics	Carl v. Ossietzky Universität Oldenburg (4) Ruhr-Universität Bochum (50) Universität Augsburg (63)	3
environmental engineering	Internationales Hochschulinstitut Zittau (36) Universität Kaiserslautern (76)	2
Integrative environmental economics, law	Private Universität Witten-Herdecke (48) Universität zu Köln (88)	2
Environment – Economy – Law/ Environmental Law and economics	Fachhochschule Bingen (8) TU Darmstadt (58)	2
Energy and environmental economics	TU Clausthal (57)	1
Ecological communication	Internationales Hochschulinstitut Zittau (37)	1
Ecology	Universität Mannheim (82)	1
Landscape planning and environmental economics	Universität Rostock (84)	1
Environmental economics and system management	Universität Hannover (75)	1
<i>Compulsory Course (major)</i>		
Corporate environmental management	Fachhochschule Fulda (9) Hochschule Anhalt (FH) (29) HTW Dresden (FH) (32) Martin-Luther-Universität Halle-Wittenberg (44) Universität Hamburg (73) Universität Lüneburg (81)	6

**Table 5** Type of specialisation (continued)

<i>Name</i>	<i>University/University of applied sciences (*)</i>	<i>Number</i>
<i>Compulsory Course (major)</i>		
Environment and logistics management	Fachhochschule Harz (11)	2
	Philipps-Universität Marburg (47)	
Environment and resource management	Handelshochschule Leipzig (26)	2
	Universität Stuttgart (86)	
Marketing and environment	Otto-Friedrich-Universität Bamberg (45)	1
Material and energy flows in the economy	Universität Karlsruhe (77)	1
Environmental economics	Universität Greifswald (72)	1
Environmental technology /recycling	HTW Dresden (FH) (31)	1
Energy and environmental protection	HTWS Zittau/Görlitz (34)	1
<i>Optional Course (major)</i>		
Environmental economics, ecological economics	Johannes-Gutenberg-Universität Mainz (39)	6
	Justus-Liebig-Universität Gießen (41)	
	Ruprecht-Karls-Universität Heidelberg (51)	
	TU Ilmenau (61)	
	Universität Potsdam (83)	
	Universität Trier (87)	
Interdisciplinary complementary studies environmental sciences	FU Berlin (24)	4
	Ruprecht-Karls-Universität Heidelberg (53)	
	Universität Bayreuth (64)	
	Universität Gesamthochschule Essen (70)	
Corporate environmental policy/ecologically oriented management	FU Berlin (23)	3
	Ruprecht-Karls-Universität Heidelberg (52)	
	Universität Gesamthochschule Kassel (68)	
Environmental and resource economics	Universität der Bundeswehr Hamburg (66)	2
	Europa-Universität Viadrina Frankfurt (Oder) (7)	
Management of circular	Otto-von-Guericke-Universität Magdeburg (46)	1
Ecology and tourism	Fachhochschule Wilhelmshaven (21)	1
Environmentally oriented production and cost theory	Universität des Saarlandes (67)	1
Environmental law	Hochschule für Technik und Wirtschaft Mittweida (FH) (30)	1
Energy and environmental management	HTWS Zittau/Görlitz (33)	1
Economic geography	Ludwig-Maximilians-Universität München (42)	1

(\*) We numbered every university. These numbers serve for identifying the content of studies in the following part of our investigation.

Source: International Graduate School Zittau.

**Table 6** Content of studies

<i>Content of studies</i>	<i>Dealt with in a subject at university<sup>1</sup></i>	<i>Number of subjects (summed up)</i>	
		<i>absolute</i>	<i>relative</i>
Environmental policy	(1), (4), (6), (7), (8), (9), (10), (13), (16), (17), (18), (19), (20), (21), (22), (23), (24), (25), (26), (27), (28), (29), (32), (33), (34), (35), (39), (41), (43), (48), (50), (51), (53), (55), (57), (58), (59), (61), (62), (63), (64), (66), (68), (69), (70), (71), (72), (75), (77), (78), (80), (81), (82), (84), (85), (86), (87), (88)	58	66%
Environmental law	(1), (6), (7), (8), (9), (10), (12), (13), (14), (16), (17), (19), (20), (22), (23), (24), (25), (26), (27), (28), (30), (34), (35), (43), (48), (52), (53), (57), (58), (59), (62), (64), (68), (71), (73), (75), (76), (77), (78), (79), (80), (81), (82), (85)	44	50%
Economy/ecology relationship	(1), (4), (5), (6), (7), (8), (10), (11), (12), (13), (15), (16), (17), (18), (19), (20), (21), (22), (23), (25), (26), (27), (28), (29), (32), (33), (34), (35), (37), (39), (41), (43), (44), (45), (47), (48), (51), (52), (53), (54), (55), (57), (58), (59), (62), (63), (64), (65), (66), (68), (69), (70), (71), (73), (74), (75), (76), (77), (78), (79), (80), (81), (82), (83), (84), (85), (86), (88)	68	77%
Strategic environmental management	(1), (2), (6), (8), (10), (16), (19), (20), (25), (26), (27), (28), (29), (32), (33), (34), (35), (38), (40), (43), (44), (45), (48), (52), (53), (54), (56), (57), (59), (62), (63), (64), (65), (68), (69), (70), (71), (73), (74), (77), (78), (79), (80), (81), (83), (85), (88)	47	53%
Environmental management instruments	(1), (2), (5), (6), (7), (8), (10), (13), (14), (16), (17), (18), (19), (20), (23), (24), (25), (26), (27), (28), (29), (32), (33), (35), (37), (38), (40), (43), (44), (48), (49), (52), (53), (54), (55), (58), (59), (62), (63), (64), (65), (68), (69), (70), (71), (73), (75), (76), (77), (78), (80), (81), (82), (83), (85), (88)	56	64%
– Specifically Input-Output-Analysis	(1), (4), (8), (14), (16), (19), (20), (25), (26), (28), (32), (33), (35), (37), (40), (55), (59), (62), (64), (68), (69), (71), (76), (81), (88)	25	28%
– Specifically eco balances	(1), (2), (7), (8), (14), (16), (17), (19), (20), (23), (25), (26), (27), (28), (32), (33), (35), (37), (40), (43), (44), (49), (59), (62), (64), (68), (69), (71), (73), (75), (76), (77), (78), (80), (81), (82), (83), (85), (88)	39	44%
– Specifically environmental accounting	(1), (8), (14), (19), (20), (25), (26), (27), (28), (32), (35), (40), (43), (44), (49), (59), (62), (64), (68), (69), (71), (73), (78), (80), (81), (85), (88)	27	31%
– Specifically eco controlling	(1), (2), (8), (10), (14), (16), (19), (20), (23), (25), (26), (27), (28), (29), (32), (33), (35), (37), (40), (43), (44), (49), (53), (54), (58), (59), (62), (64), (65), (68), (69), (71), (73), (75), (77), (78), (80), (81), (83), (88)	40	45%
– Specifically environmental audit	(1), (2), (7), (8), (10), (14), (16), (17), (19), (20), (23), (25), (26), (28), (32), (33), (35), (37), (38), (40), (43), (44), (49), (53), (59), (62), (64), (68), (69), (71), (73), (75), (77), (78), (81), (83), (85), (88)	38	43%
– Specifically eco labelling	(1), (5), (8), (25), (26), (32), (35), (44), (55), (71), (78), (81), (83), (88)	14	16%

<sup>1</sup>Numbers correspond to Table 5

**Table 6** Content of studies (continued)

<i>Content of studies</i>	<i>Dealt with in a subject at university<sup>1</sup></i>	<i>Number of subjects (summed up)</i>	
		<i>absolute</i>	<i>relative</i>
Environmental management systems	(1), (2), (6), (8), (10), (11), (13), (14), (15), (16), (17), (19), (20), (23), (25), (26), (28), (32), (33), (35), (37), (40), (43), (44), (48), (52), (54), (57), (59), (62), (63), (64), (65), (68), (69), (70), (71), (73), (77), (78), (80), (83), (85)	43	49%
Environmental technology (general).	(1), (4), (7), (8), (9), (11), (12), (13), (14), (16), (17), (19), (25), (27), (28), (29), (31), (33), (34), (35), (36), (42), (48), (53), (57), (58), (64), (70), (71), (73), (76), (77), (79)	33	38%
– Specifically waste	(1), (8), (11), (16), (17), (25), (27), (28), (31), (35), (36), (42), (57), (58), (64), (71), (76), (77), (86)	19	22%
– Specifically energy	(1), (4), (7), (8), (16), (19), (20), (25), (28), (29), (31), (33), (34), (35), (36), (39), (64), (71), (73), (77)	20	23%
– Specifically water	(1), (8), (16), (25), (28), (31), (35), (36), (64), (86)	10	11%
– Specifically soil	(1), (8), (25), (31), (35), (36), (64), (86)	8	9%
– Specifically air	(1), (8), (16), (25), (28), (31), (33), (34), (35), (36), (64), (76), (77), (86)	14	16%
Environmental informatics	(3), (8), (10), (12), (19), (20), (25), (26), (29), (37), (44), (48), (49), (52), (62), (65), (69), (70), (71), (78), (79)	21	24%
Operative environmental management general	(1), (3), (5), (6), (7), (8), (9), (10), (11), (12), (13), (14), (15), (16), (17), (19), (20), (23), (24), (25), (26), (27), (28), (29), (31), (32), (33), (35), (38), (40), (42), (43), (44), (45), (46), (47), (48), (49), (52), (53), (54), (56), (57), (58), (59), (60), (62), (63), (64), (65), (67), (68), (69), (70), (71), (73), (74), (76), (77), (78), (79), (80), (81), (82), (83), (88)	66	75%
– Specifically products	(1), (5), (14), (16), (17), (19), (20), (23), (25), (26), (28), (32), (35), (38), (43), (44), (45), (54), (56), (59), (68), (69), (71), (74), (77), (81), (83), (88)	28	32%
– Specifically procurement	(1), (11), (16), (19), (20), (23), (25), (28), (29), (32), (35), (43), (44), (59), (60), (65), (69), (71), (80), (88)	20	23%
– Specifically production	(1), (3), (8), (11), (13), (14), (16), (19), (20), (23), (25), (26), (27), (28), (29), (31), (32), (35), (38), (40), (43), (44), (49), (54), (58), (59), (60), (62), (65), (67), (68), (69), (71), (73), (77), (80), (81), (88)	38	43%
– Specifically marketing	(1), (3), (5), (13), (14), (16), (17), (19), (20), (23), (25), (26), (28), (32), (35), (43), (44), (45), (53), (54), (56), (58), (59), (62), (69), (71), (73), (74), (80), (81), (83), (88)	32	36%
– Specifically logistics	(7), (11), (16), (19), (20), (23), (25), (27), (28), (29), (35), (38), (40), (43), (44), (47), (49), (54), (58), (59), (60), (65), (69), (71), (73), (88)	26	30%
– Specifically organisation	(1), (7), (8), (16), (19), (20), (23), (25), (26), (28), (29), (32), (35), (38), (43), (44), (54), (58), (59), (62), (64), (68), (69), (71), (88)	25	28%

<sup>1</sup>Numbers correspond to Table 5

**Table 6** Content of studies (continued)

<i>Content of studies</i>	<i>Dealt with in a subject at university<sup>1</sup></i>	<i>Number of subjects (summed up)</i>	
		<i>absolute</i>	<i>relative</i>
– Specifically human resource management	(1), (7), (16), (23), (25), (28), (32), (35), (38), (43), (44), (54), (59), (62), (64), (69), (71), (88)	18	20%
– Specifically finance	(8), (10), (16), (17), (25), (28), (59), (69), (71), (81), (88)	11	13%
Behavioural aspects	(1), (10), (16), (19), (20), (23), (25), (26), (27), (38), (43), (44), (48), (53), (58), (62), (63), (64), (70), (71), (75), (78), (82), (85)	24	27%
Global environmental problems	(1), (4), (7), (16), (17), (20), (21), (25), (26), (29), (33), (34), (35), (36), (39), (43), (44), (48), (53), (55), (58), (62), (64), (70), (71), (73), (75), (78), (81), (85)	30	34%
Local problems	(11), (16), (17), (19), (20), (25), (33), (34), (35), (36), (59), (62), (81)	13	15%
International aspects	(1), (7), (8), (19), (20), (25), (26), (27), (33), (34), (35), (36), (37), (42), (48), (50), (53), (55), (59), (62), (65), (75), (77)	23	26%
– Specifically Eastern Europe	(7), (34), (33), (19), (20), (36), (37), (75), (77)	9	10%
– Specifically Western Europe/USA	(1), (7), (8), (19), (20), (27), (35), (50), (59), (62), (75), (77)	12	14%

<sup>1</sup>Numbers correspond to Table 5

Source: International Graduate School Zittau.

**Table 7** Classification of content

<i>Type of course</i>	<i>Environmental issues as a specialisation in business administration</i>	<i>Environmental issues as a specialisation in economics</i>	<i>Environmental issues integrated in business administration/economics</i>	<i>Integration of environmental issues in 'classical' subjects like Production or Marketing</i>	<i>Other disciplines (such as technology, law, geography)</i>
Programs	1		3		
Specialisation	22	7	2	9	8
Compulsory course	6	3	1	3	2
Optional course	3	8	0	3	7
Total	32	18	6	15	17

Source: International Graduate School Zittau.

We classified all courses as 'Environmental orientation as specialisation in business administration' covering a broad range of topics (represented in Table 6) but focusing on business-related aspects. This group is the biggest (32).



We classified all courses as 'Environmental orientation as a specialisation in economics' focusing on the integration of ecological aspects in economics. These courses cover topics such as the relationship of ecology and economy or environmental policy. This group covers a relatively high number of courses (18).

We included all courses in the group 'Environmental orientation integrated in business administration/economics' integrating ecological aspects into economics education from a business study as well as economic perspective. They cover a broad range of topics, similar to the first group, but focus on business administration and economics. Six courses belong to this group.

Besides the analysed groups, courses exist representing a 'classical' specialisation in business administration. These courses especially pay attention to environmental aspects. In contrast to the above-mentioned courses, ecological aspects are not dealt with in a special course. They are seen as an integrated aspect of traditional disciplines in business administration such as marketing, logistics, cost accounting or industrial production. This integration is undertaken in 15 courses.

Last but not least, subjects are offered within the framework of economic education but stem from other scientific disciplines such as technology, law or geography. In this group are 15 courses completing education in economics. These courses are useful due to the diversity of ecological problems.

### *Result of the investigation*

Due to the long-term development of environmental consciousness in Germany since the 1970s, a diverse landscape of environmental education in general, and especially in the education of economics, has developed at German universities and universities of applied sciences.

- importance of ecological aspects in economics and business administration

Economic subjects including environmental aspects are established at many universities, comprehensive universities and universities of applied sciences. They range from additional courses to compulsory specialisations and compulsory courses or even specific programs. These results reflect the relatively high importance of environmentally oriented economics. Despite this, they still do not have the same importance as the traditional courses in economics and business administration and do not respond to the importance of ecological problems.

- degree of integration in relation to labour market demand

It is meaningful to integrate environmental aspects into the compulsory core program of economics education. Future economics scientists and managers can get an insight into the manifold relationships between economics and ecology and the resulting social development this way and therefore obtain the capabilities for sustainability oriented acting. Due to the increasing tendency towards the integration of ecological and economics topics, a further and deeper insight into such aspects is desirable for interested students. The labour market determines if a complete specialisation within the framework of new graduate programs is required or an ecological focus by a specialisation or a compulsory course. At the moment, we can observe the tendency that all graduates should have a basic knowledge about ecology. Special attention is paid to broad non-ecological subject-specific training and soft skills [18]. In addition, a small but

increasing demand for professionals with core competencies in ecology can be observed. This demand might correspond to the existing educational programs in economics and business administration [19].

- specific content of ecological aspects in economics education

According to the diversity of environmental oriented programs, the very diverse and rich range of topics does not surprise. They range from the relationship between economics and ecology, to aspects of environmentally oriented management in the form of strategic and operational environmental management, including environmental management instruments and systems, environmental policy and law to adjoining areas such as environmental psychology, ethics and environmental technology. According to the respective orientation of the courses, either single aspects are deeply analysed or a more general (partly also focusing) overview about a bundle of possible topics is given.

- interdisciplinary approach

We can generally find a basic interdisciplinary approach in all investigated courses. This is partly due to the nature of environmental issues. At least, knowledge from ecology and economics is linked, in many courses additional knowledge from other areas such as political sciences, law or behavioural sciences is provided. In four cases, courses are composed of lectures from different departments. In our investigation, we could not analyse to what degree the contents of the different lectures are linked in detail. To our mind, an even stronger joint approach of different disciplines is necessary.

**Table 8** Strengths and weaknesses

<i>Strengths</i>	<i>Weaknesses</i>
<ul style="list-style-type: none"> <li>• diversity of environmentally oriented education in general and in business administration and economics</li> <li>• many possibilities for specialisations by establishing ecologically-oriented programs in economics and business administration and offering many specialisations in economics and business administration</li> <li>• integration of the ecology-oriented education in the traditional economic programs by environmentally-oriented compulsory courses and the respective extension of classical courses in business administration</li> </ul>	<ul style="list-style-type: none"> <li>• international dimension is missing in environmentally oriented economics</li> <li>• only limited approaches to interdisciplinary work with some exceptions</li> </ul>

*Source:* International Graduate School Zittau.

- international approach

An international orientation of problems of environmentally oriented economics is lacking despite the fact that in the national context environmental issues are dealt with in a diverse and very broad manner. This lack of international orientation is especially problematic because environmental problems do not respect national borders and

enterprises increasingly act in an international context. This is very obvious, if a focus on Middle and Eastern Europe is considered, bearing in mind the enlargement of the EU to Eastern Europe. The European University Viadrina in Frankfurt/ Oder deals with international topics, especially focusing on Poland, but it does not focus on environmental management issues. Therefore we can state a deficit in this area, especially in the context of globalising markets and the future EU enlargement to Eastern Europe.

## **6 Perspectives**

Parallel to this analysis, research was conducted into the situation of environmental education at Polish and Czech universities at the International Graduate School Zittau. The above-mentioned Access-database was completed by 19 Czech and 38 Polish universities [20]. First results of this research show that environmental aspects are mainly integrated into natural sciences and engineering. In economics and business administration, they are only partly and to a very limited degree (regarding the offered lectures) considered.

That is why the task arises to develop a curriculum for environmentally oriented management which is not only interdisciplinary but also explicitly focuses on Middle and Eastern Europe. This curriculum should include the numerous German and European experiences in the area of the integration of ecological aspects into economics. For that reason, at present we are developing a new specialisation 'international and interdisciplinary environmental management' at the International Graduate School (IHI Zittau). This specialisation is developed within the framework of a project being sponsored by the German Federal Environmental Foundation (Deutschen Bundesstiftung Umwelt) [21]. This project is supported by a broad network of universities and universities of applied sciences, institutions and firm representatives from Germany, Poland and the Czech Republic. Among the universities and universities of applied sciences are three German universities and one university of applied sciences with a long tradition in environmental management training.

The profile of the specialisation is directed to the specific challenges of German, Polish and Czech markets. All topics are presented in a German-Polish-Czech context. At the same time, the profile is interdisciplinary: problems from business administration and economics are jointly dealt with legal, technical and behavioural aspects. This way, we try to develop students' attention to networked problems. A strict orientation towards practical issues also promotes this attention. We do not only present practical examples to our students, but they learn to deal with specific problems and approaches for finding solutions in case studies and projects.

At the International Graduate School Zittau, international students have the opportunity to learn about environmental management and to discuss questions and problems. Based upon these experiences, our target and, in particular, the target of our project partners, is to transfer this curriculum to universities in Poland and the Czech Republic. Therefore we also developed a textbook and an interactive CD which can be used by all who are interested in international and interdisciplinary environmental management with a focus on Germany, Poland and the Czech Republic. In this way, the project contributes in the area of 'green curricula' to make the coalescing Europe more sustainable.

## References and Notes

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- 14 De Haan, G., Donning, I. and Schulte, B. (1999) *Der Umweltstudienführer*, Stuttgart.
- 15 We would like to thank Mr. Markus Lehmann (Dipl.-Kfm.) for building up and maintaining the database, without which we would not have been able to conduct our research.
- 16 The difference between 66 and 88 is caused by the fact that at one university several programs in economics are environmentally oriented. One course is offered as a minor or major in different programs, therefore the number of courses increases from 88 to 103 identified programs. We did not consider if two different subjects were offered in the same program. For that reason some programs might be counted twice if in one program an environmentally oriented specialisation is offered in addition to a comprehensive course.
- 17 These results are supported by the 'Guide to Environmental Studies': in the area of social sciences 20 programs at universities of applied sciences and 38 programs at universities were listed. The relationship between the absolute number of programs in economics and business administration at universities and at universities of applied sciences is reversed (On the homepage of the HRK in 2000, 196 programs at universities and 373 programs at universities of applied sciences were listed (<http://www.hochschulkompass.hrk.de/>)).
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- 20 Kramer, M. and Urbaniec, M. (2001) 'Ochrona srodowiska w nauczaniu ekonomicznym i przyrodniczym na polskich uczelniach', in *Ekoprofit*, No. 1, pp.34–37 and No. 2, pp.55–57; Sucharda J. and Kramer, M. (2000) Umweltbildung an tschechischen Hochschulen, <http://www.ihl-zittau.de/bwl/>.
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