Enhancing Entrepreneurship Education Programs in Germany and the Netherlands

A benchmark study of Higher Education Institutes in the Euregio Rhein-Waal

November, 2013

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Benchmarking Entrepreneurship Education Programs

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Executive summary - English

Entrepreneurship is nowadays seen as one of the vital factors in stimulating economic growth (Gorman et al., 1997). There is a positive correlation between entrepreneurship and economic growth, but also innovation, technological change and employability creation correlate positively with entrepreneurship (NIRAS, 2008). The role of education to foster entrepreneurship is recognized by European policy makers and therefore entrepreneurship education is implemented at higher education institutes (HEIs) throughout the Euregio Rhein-Waal. There is no standardized entrepreneurship program which is implemented at all higher education institutes, the several entrepreneurship education programs offered at different HEI's differ in nature and structure. One of the problems that arise is that it is not clear what kind of entrepreneurship education truly fosters entrepreneurship and therefore stimulates the performance of these higher education institutes.

An extensive study on entrepreneurship education is used throughout this particular study; the study by Blok et al. (2013) makes use of a benchmark study as a method for analysing the current performance of the entrepreneurship education programs and the identification of good practices. This study by Blok et al. (2013) was performed at several HEI's in the USA, Canada and Europe. The results of the study performed by Blok et al. (2013) indicate that there are possible improvements for some dimensions when looking at the performance of several HEI's concerning entrepreneurship education.

The performance is measured by three performance indicators: entrepreneurial students through education, knowledge transfer to society, entrepreneurial students through practice. The dimensions of entrepreneurship education which can be seen as the input and throughput of the entrepreneurship education programs are also based on the report by NIRAS et al. (2008) and Blok et al., (2013). More specifically, the input which is necessary for developing and maintaining a well-functioning entrepreneurship program are: *strategy, resources and institutional infrastructure*. The throughput contains the following dimensions: *education, outreach and development*. When these inputs and processes are functioning well, the output (performance) is expected to be good as well.

The dimension outreach is seen as an important dimensions for becoming an entrepreneurial HEI (NIRAS et al., 2008) and the results from Blok et al. (2013) show that this dimension needs more in-depth insights. Acquiring entrepreneurial competences not only concerns doing theoretical exercises; offering opportunities for gaining practical experience is essential for an effective entrepreneurship education program (NIRAS et al., 2008). The dimension outreach involves links with external stakeholders in which university – industry linkages (UILs) are considered to play a central role. These links with external stakeholders can help students to become successful entrepreneurs while they are studying, but also stimulate teachers to become more entrepreneurial (Rasmussen &

Sørheim, 2006). This study zooms in on these collaborations between higher education institutes and the industry, as the study of Blok et al. (2013) lacks in-depth information on this dimension.

Literature provided general drivers and barriers for these collaborations and an overview of the literature related to university-industry collaborations was made. Additional questions, based on the figure presented below, are added to the already existing benchmark questions, which are derived from the study by Blok et al. (2013).

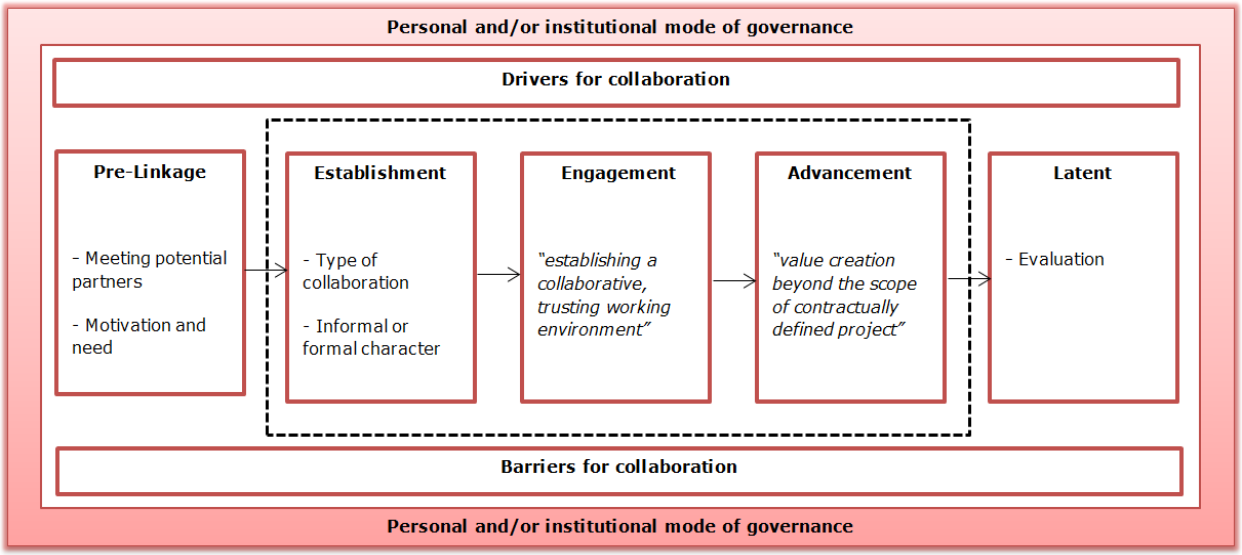


Figure I. Overview of results desk-study about university-industry linkages

Semi-structured interviews were held with a representative of the centre of entrepreneurship and a senior lecturer in entrepreneurship at the Universität Duisburg-Essen, Hogeschool Arnhem en Nijmegen, Technische Universiteit Eindhoven, Hochschule Rhein-Waal, Wageningen University and research centre and the Radboud Universiteit Nijmegen.

Performance

When looking at the results of the performance of the participating HEIs, the conclusion can be drawn that three types of HEIs can be distinguished. The first type of HEI has excellent scores on one or more performance indicators, another type of HEI has fairly constantly good scores and there are HEIs that are not among the best performing institutes on any performance indicator.

There are three education institutes that belong to the first type of entrepreneurship education programs. One of these education institutes has a high performance due to large scale knowledge transfer. Another education institute performs well on developing an entrepreneurial mind-set through education and the third education institute performs well on developing an entrepreneurial mind-set through practical experience. These three institutions are complementary to each other and are therefore used together as sources of inspiration for improvement of the other entrepreneurship education programs.

Strategy

Where the study by NIRAS et al. (2008) shows the importance of embedding entrepreneurship education in the mission statement and strategy of the institution, this study does not show this. Just as was the case in the study of Blok et al. (2013), two of the good practice HEIs do not show a high score on this dimension. Therefore, the embeddedness of entrepreneurship (education) in the strategy seems to be not of great importance for a high performance of these higher education institutes.

Resources

Contrary to the report for the European Commission (NIRAS et al., 2008), but in line with Blok et al. (2013) there are no major differences identified between the education institutes with regard to the dimension resources. In general, the higher education institutes are satisfied with the financing of the current entrepreneurship education program and financing of new initiatives. The availability of resources is not perceived as a primary barrier for entrepreneurship education. In contrast with the other higher education institutes, the good practice examples are engaged in self-generating income activities.

Institutional infrastructure

High quality entrepreneurship education programs are distinctive in having a sound supportive infrastructure, for example incubator facilities and a centre of entrepreneurship, but also scientific research in entrepreneurship and a multidisciplinary approach in entrepreneurship education. In general, the good practice education institutes score well on the dimension institutional infrastructure.

Education

The dimension education covers both the number and size of the courses and the set-up of entrepreneurship education. The good practice education institutes differ from the other education institutes regarding their experiential didactic methods and they confront students with real-life entrepreneurship problems. With regard to guest lectures, assumed to be crucial to high quality entrepreneurship education, the scores are not that high for all HEIs.

Outreach

Findings indicate that better performing entrepreneurship education programs have created a well-developed and wide network of stakeholders. Furthermore, they develop initiatives to promote entrepreneurship in the environment around the education institute. The involvement of alumni in entrepreneurship education is underdeveloped at most of the participating higher education institutes. Spin-off creation and licensing of intellectual property are two types of collaboration with industry which make the differences between good practice HEIs and the other HEIs.

Development

An important conclusion to be drawn is that investing in human resources receives (almost) no attention at all the higher education institutes. Hardly any lecturer is specifically trained to teach entrepreneurship. There are also little or no means available to encourage or stimulate teaching entrepreneurship.

The results show that there are many different ways of implementing entrepreneurship in the education program, but that there is still a lot of room for improvement. Lower scoring HEIs can learn from the good practice examples, even though there is also room for the good scoring HEIs to improve their entrepreneurship education program. Entrepreneurship could, for example, be more embedded in the organization by stating goals related to entrepreneurship education in the strategic plan of the HEI. Furthermore, it is likely that there are high-level managers willing to take up the role of acting as a champion of entrepreneurship. These high-level managers can act as champions of entrepreneurship and subsequently try to draw attention from the university board with the aim of making entrepreneurship more central to the institution. Offering students more practical experiences is another recommendation. The latter can be improved by making more use of the alumni network or industry, by means of arranging guest lecturers or cases on which students can work. Also getting involved in spin-off creation and licensing intellectual property seem two ways of collaborating with industry which positively affects the performance. This report gives some valuable insights in the current condition of entrepreneurship education programs in the Euregio Rhein-Waal and can be used as a starting point for the participating HEIs to improve their entrepreneurship education program.

Executive summary - Nederlands

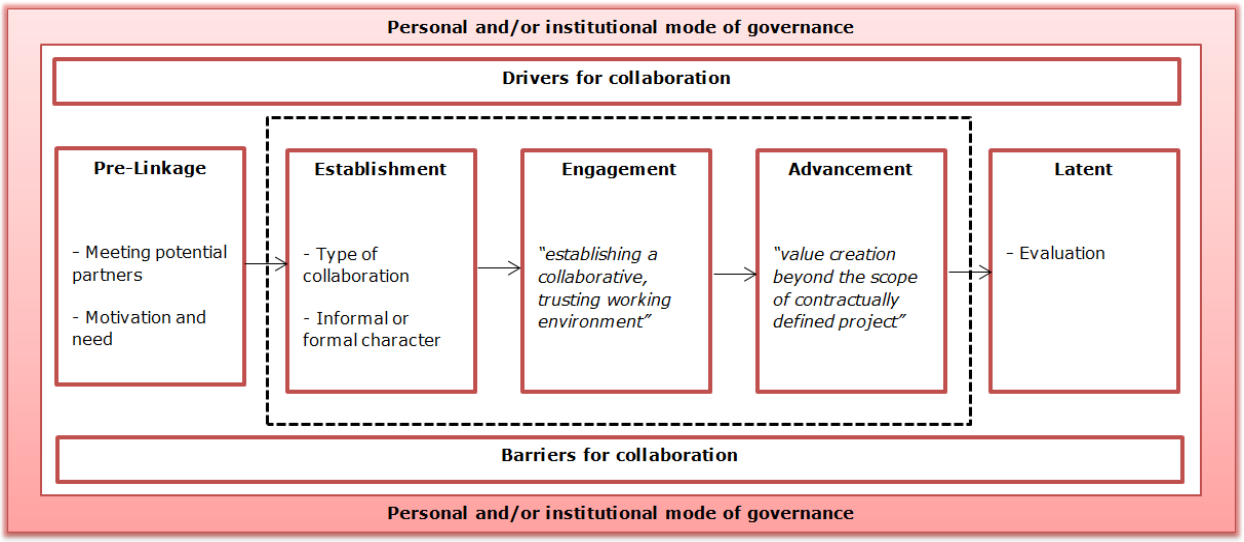
Ondernemerschap wordt tegenwoordig gezien als één van de essentiële factoren in het stimuleren van de economische groei (Gorman et al.., 1997). Er is een positief verband tussen ondernemerschap en economische groei, maar ook innovatie, technologische verandering en creatie van werkgelegenheid correleren positief met ondernemerschap (NIRAS, 2008). De rol van onderwijs om ondernemerschap te stimuleren wordt erkend door Europese beleidsmakers en dus wordt ondernemerschap geïmplementeerd in het onderwijs bij verschillende instellingen voor hoger onderwijs (HEIs) in de Euregio Rijn-Waal. Er is geen gestandaardiseerd ondernemerschap programma dat wordt toegepast op alle instellingen voor hoger onderwijs; de verschillende ondernemerschapsonderwijsprogramma's aangeboden op verschillende HEIs verschillen in aard en structuur. Een van de problemen die zich voordoen is dat het niet duidelijk is wat voor soort ondernemerschapsonderwijs, ondernemerschap het beste bevordert. Daarom wordt in dit rapport een uitgebreide studie over ondernemerschapsonderwijs gepresenteerd.

De studie van Blok et al. (2013) maakt gebruik van een benchmark studie als methode om de huidige performance van ondernemerschapsonderwijsprogramma's te analyseren en het identificeren van 'good practices'. Deze studie werd door Blok et al. (2013) uitgevoerd op verschillende HEIs in de Verenigde Staten, Canada en Europa. De resultaten van de studie geven aan dat er op basis van de performance van deze HEIs mogelijke verbeteringen zijn, wanneer men kijkt naar de verschillende dimensies voor ondernemerschapsonderwijs. De performance wordt gemeten door drie performance-indicatoren: ondernemende studenten door onderwijs, kennisoverdracht aan de maatschappij, ondernemende studenten door praktijkervaringen.

De dimensies van het ondernemerschapsonderwijs kunnen worden gezien als de input en throughput van het ondernemerschapsonderwijsprogramma. Deze zijn gebaseerd op het rapport van NIRAS et al. (2008) en Blok et al. (2013). Meer specifiek, de input die nodig is voor het ontwikkelen en onderhouden van een goed functionerend ondernemerschap onderwijsprogramma zijn de dimensies: *strategy, resources en institutional infrastructure.* De throughput bevat de volgende dimensies: *education, outreach en development.* Wanneer deze inputs en throughputs goed functioneren, wordt de output (performance) ook verwacht goed te zijn. De dimensie outreach wordt gezien als een belangrijke dimensie voor een ondernemende HEI (NIRAS et al., 2008) en de resultaten van Blok et al. (2013) laten zien dat deze dimensie meer diepgaande inzichten vergt. Het verwerven van ondernemende competenties heeft niet alleen betrekking op het doen van theoretische oefeningen; het aanbieden van mogelijkheden voor het verkrijgen van praktische ervaring is essentieel voor een effectief ondernemerschapsonderwijsprogramma (NIRAS et al., 2008).

De dimensie outreach gaat over contacten met externe stakeholders waarbij met name universiteiten en de industrie samenwerkingsverbanden (UILs) met elkaar aan gaan. Deze contacten met externe stakeholders kunnen studenten helpen om een succesvolle ondernemer te worden terwijl nog ze studeren, maar ook docenten stimuleren om meer ondernemend te worden (Rasmussen & Sorheim, 2006). Dit onderzoek zoomt in op deze samenwerkingsverbanden tussen instellingen voor hoger onderwijs en de industrie, omdat de studie van Blok et al. (2013) diepgaande informatie over deze dimensie mist.

De literatuur voorziet ons van algemene drivers en barrières van deze samenwerkingsverbanden en een overzicht de kenmerken van de universiteit-industrie samenwerkingen werd gemaakt (figuur 1). Extra vragen, gebaseerd op de figuur hieronder zijn toegevoegd aan de reeds bestaande benchmark vragen, die zijn afgeleid van de studie van Blok et al. (2013).



Figuur 1: overzicht van de gevonden literatuur over samenwerkingsverbanden tussen universiteit en industrie.

Semigestructureerde interviews met een vertegenwoordiger van het centrum voor ondernemerschap en een senior docent in ondernemerschap werden gehouden. De volgende universiteiten hebben deelgenomen aan deze studie: de Universität Duisburg-Essen, Hogeschool Arnhem en Nijmegen, Technische Universiteit Eindhoven, Hochschule Rhein-Waal, Wageningen Universiteit en Research Center en de Radboud Universiteit Nijmegen.

Performance

Wanneer we kijken naar de resultaten van de performance van de deelnemende instellingen voor hoger onderwijs, kan de conclusie worden getrokken dat er drie typen onderwijsinstellingen kunnen worden onderscheiden. Het eerste type HEI heeft uitstekende scores op een of meer performance-indicatoren, een ander type HEI heeft redelijk constante goede scores en er zijn instellingen voor

hoger onderwijs die niet behoren tot de best presterende instituten op alle performance-indicatoren. Er zijn drie onderwijsinstellingen die behoren tot de eerste soort ondernemerschapsonderwijsprogramma's. Eén van deze onderwijsinstellingen heeft zijn hoge performance te wijten aan hun grootschalige kennisoverdracht. Een andere onderwijsinstelling presteert goed op het ontwikkelen van een ondernemende mind-set door middel van onderwijs en een derde onderwijsinstelling presteert goed op het ontwikkelen van een ondernemende mind-set door middel van praktische ervaring. Deze drie instellingen zijn complementair aan elkaar en worden daarom samen gebruikt als bronnen van inspiratie voor verbetering van de overige ondernemerschapsonderwijsprogramma's.

Strategy

Terwijl de studie van NIRAS et al. (2008) het belang van de inbedding van het ondernemerschapsonderwijs in de missie en strategie van de instelling aantoont, doet dit onderzoek dit niet. Net zoals het geval was in de studie van Blok et al. (2013), hebben twee van de drie good practice onderwijsinstellingen geen hoge score op deze dimensie. Daarom lijkt de inbedding van ondernemerschap (onderwijs) in de strategie niet van groot belang voor een hoge performance in hoger onderwijs.

Resources

In tegenstelling tot het verslag van de Europese Commissie (NIRAS et al., 2008), maar in lijn met Blok et al. (2013), zijn er geen grote verschillen geconstateerd tussen de onderwijsinstellingen met betrekking tot de dimensie resources. In het algemeen zijn de instellingen voor hoger onderwijs tevreden over de financiering van het huidige ondernemerschapsonderwijsprogramma en de financiering van nieuwe initiatieven. De beschikbaarheid van (financiële) middelen wordt niet gezien als een primaire barrière voor het ondernemerschapsonderwijs. In tegenstelling tot de andere instellingen voor hoger onderwijs, genereren de good practice voorbeelden eigen inkomsten uit het organiseren van verschillende activiteiten.

Institutional Infrastructure

Hoge kwaliteit ondernemerschapsonderwijsprogramma's zijn onderscheidend in het hebben van een goede ondersteunende infrastructuur, bijvoorbeeld incubator-faciliteiten en een centrum voor ondernemerschap. Maar ook wetenschappelijk onderzoek in ondernemerschap en een multidisciplinaire aanpak in het ondernemerschapsonderwijs zijn onderscheidende factoren. In het algemeen scoren de good practice onderwijsinstellingen goed op de dimensie institutionele infrastructuur.

Education

De dimensie education omvat zowel het aantal en de omvang van de cursussen als de opzet van het ondernemerschapsonderwijs. De good practice onderwijsinstellingen verschillen van de andere onderwijsinstellingen ten aanzien van hun ervaringsgerichte didactische methodes en dat ze studenten confronteren met real-life ondernemerschap problemen. Met betrekking tot gastcolleges, die als cruciaal worden gezien voor een hoge kwaliteit van het ondernemerschapsonderwijs, zijn de scores niet zo hoog voor alle participerende hoger onderwijsinstellingen.

Outreach

De bevindingen wijzen erop dat de beter presterende onderwijsinstellingen een goed ontwikkeld en breed netwerk van stakeholders hebben gecreëerd. Bovendien ontwikkelen ze initiatieven om ondernemerschap te bevorderen in de omgeving rond het onderwijsinstituut. De betrokkenheid van alumni in het ondernemerschapsonderwijs is onderontwikkeld bij de meeste van de deelnemende instellingen voor hoger onderwijs. Spin-off creatie en licenties van intellectueel eigendom zijn twee soorten van samenwerking met de industrie, die duidelijk verschillen tussen de good practice onderwijsinstellingen en de andere instellingen voor hoger onderwijs maken.

Development

Een belangrijke conclusie die getrokken kan worden is dat investeren in human resources (bijna) geen aandacht ontvangt van de deelnemende instellingen voor hoger onderwijs. In weinig gevallen worden docenten speciaal opgeleid om ondernemerschap te onderwijzen. Er zijn ook weinig of geen middelen beschikbaar om ondernemerschapsonderwijs te stimuleren onder de medewerkers.

De resultaten laten zien dat er veel verschillende manieren van implementatie van ondernemerschap in het onderwijsprogramma zijn, maar dat er nog veel ruimte voor verbetering is. Lager scorende hoger onderwijsinstellingen kunnen leren van de voorbeelden van good practice onderwijsinstellingen. Ook is er ruimte voor de goed scorende onderwijsinstellingen om hun ondernemerschapsonderwijs te verbeteren. Ondernemerschap kan bijvoorbeeld meer worden ingebed in de organisatie door doelen te stellen in het strategisch plan van de HEI, die verband houden met ondernemerschapsonderwijs. Bovendien wordt er aanbevolen dat er op hoog niveau managers bereid worden gevonden tot het nemen van de rol ´champion of entrepreneurship´. Deze managers op hoog niveau kunnen fungeren als ´voorvechters´ van ondernemerschap en vervolgens proberen om de aandacht te trekken van de universiteitsraad met het doel om ondernemerschap een meer centrale rol te geven in de instelling. Het aanbieden van meer praktische ervaringen voor studenten is een andere aanbeveling. Dit laatste kan worden verbeterd door meer gebruik te maken

van het alumni netwerk of de industrie, bijvoorbeeld door middel van het aantrekken van gastdocenten of cases waar leerlingen aan kunnen werken. Ook betrokken zijn bij spin-off creatie en het licenseren van intellectueel eigendom blijken twee manieren van samenwerking met de industrie die een positief effect hebben op de performance van de onderwijsinstellingen. Dit rapport geeft een aantal waardevolle inzichten in de huidige situatie van het ondernemerschap onderwijs in de Euregio Rijn-Waal en kan worden gebruikt als uitgangspunt voor de deelnemende onderwijsinstellingen om hun ondernemerschap onderwijsprogramma op te zetten of te verbeteren.

Executive summary – Deutsch

Unternehmertum wird heute als einer der wichtigsten Faktoren zur Stimulierung des Wirtschaftswachstums gesehen (Gorman et al., 1997). Es besteht nicht nur eine positive Korrelation zwischen Unternehmertum und Wirtschaftswachstum, sondern auch zwischen Unternehmertum und Innovation, technologischem Wandel und der Entstehung von Beschäftigungsfähigkeit auf dem Arbeitsmarkt (NIRAS, 2008). Europäische Entscheidungsträger haben erkannt, dass Bildungsinstitute eine wichtige Rolle bei der Förderung von Unternehmergeist spielen, sodass Unternehmerschaft an Hochschulen in der Euregio Rhein-Waal bereits Teil Lehrplans ist. Es gibt keine standardisierten Bildungsinhalte für die Unternehmertum-Kurse an den Hochschulen; die verschiedenen Bildungsprogramme zum Unternehmertum unterscheiden sich sowohl in ihrer Art als auch in ihrer Struktur an den verschiedenen Hochschulen.

Eines der Probleme ist, dass es nicht deutlich ist, welche Art von Bildung tatsächlich unternehmerisches Denken fördert und zugleich die Leistung dieser Hochschulen stimuliert. Dies vorliegende Studie bezieht sich durchgehend auf eine umfangreiche Studie zur Bildung von unternehmerischem Denken: die Studie von Blok et al. (2013) verwendet eine Benchmark-Untersuchung als Methode zur Analyse der aktuellen Leistung der Unternehmertum-Kurse und zur Ermittlung bewährter Praktiken. Die Studie von Blok et al. (2013) wurde an verschiedenen Hochschulen in den USA, Kanada und Europa durchgeführt. Die Ergebnisse der Studie von Blok et al. (2013) zeigen, dass bei der Leistung der Hochschulen zur Förderung von unternehmerischem Denken in einigen Aspekten Verbesserungsmöglichkeiten gibt.

Die Leistung wird anhand von drei Indikatoren gemessen: Studenten, die durch das Bildungsangebot der Hochschulen zu Unternehmern geworden sind, die Weitergabe von Wissen an die Gesellschaft, und Studenten, die durch die Berufspraxis zu Unternehmern geworden sind. Auch die Aspekte, die vor und während der Unternehmertum-Kurse zum Einsatz kommen und zur Bildung von Unternehmertum beitragen, basieren auf dem Bericht von NIRAS et al. (2008) und Blok et al., (2013). Bei den Aspekten, die für die Entwicklung eines gut funktionierenden Unternehmertum-Kurses von Bedeutung sind, handelt es sich um die folgenden: *Strategy, Resources und Institutional infrastructure.* Bei den Aspekten, die während des interne Prozess wichtig sind, handelt es sich um folgende: *Education, Outreach, und Development.* Wenn diese Vorbedingungen und Prozesse gut funktionieren, wird erwartet, dass auch das Ergebnis (die Leistung) gut ist. Der Aspekt der Zusammenarbeit mit der Wirtschaft (outreach) wird als besonders wichtig für die Entwicklung einer unternehmerischen Hochschule erachtet (NIRAS et al., 2008). Die Ergebnisse von Blok et al. (2013) zeigen, dass dieser Aspekt noch genauer untersucht werden muss.

Für den Erwerb unternehmerischer Kompetenzen sind nicht nur theoretische Übungen erforderlich. Für effektive Unternehmertum-Kurse ist es unerlässlich, auch Möglichkeiten anzubieten,

um praktische Erfahrungen zu sammeln (NIRAS et al 2008). Bei dem Aspekt der Zusammenarbeit mit der Wirtschaft geht es um Kontakte zu externen Akteuren und die Rolle der Kooperationen zwischen Hochschulen und Wirtschaft. Diese Kontakte zur Wirtschaft können Studenten helfen, schon während Ihres Studiums erfolgreiche Unternehmer zu werden, und stimuliert zudem auch Lehrkräfte, stärker unternehmerisch tätig zu werden (Rasmussen & Sørheim, 2006). Da in der Studie von Blok et al. (2013) ausführliche Informationen zu diesem Aspekt fehlen, thematisiert dies vorliegende Studie vor allem die Kooperationen zwischen Hochschulen und Wirtschaft und Industrie.

In der Literatur sind allgemeine Einflussfaktoren und Barrieren dieser Kooperationen zu finden; ein Überblick über diese Literatur in Bezug auf Kooperationen zwischen Hochschulen und der Wirtschaft wurde erstellt. Weitere Fragen, die auf der unten gezeigten Darstellung basieren, wurden zu den bereits bestehenden Benchmark-Fragen ergänzt, welche der Studie von Blok et al. (2013) entnommen sind.

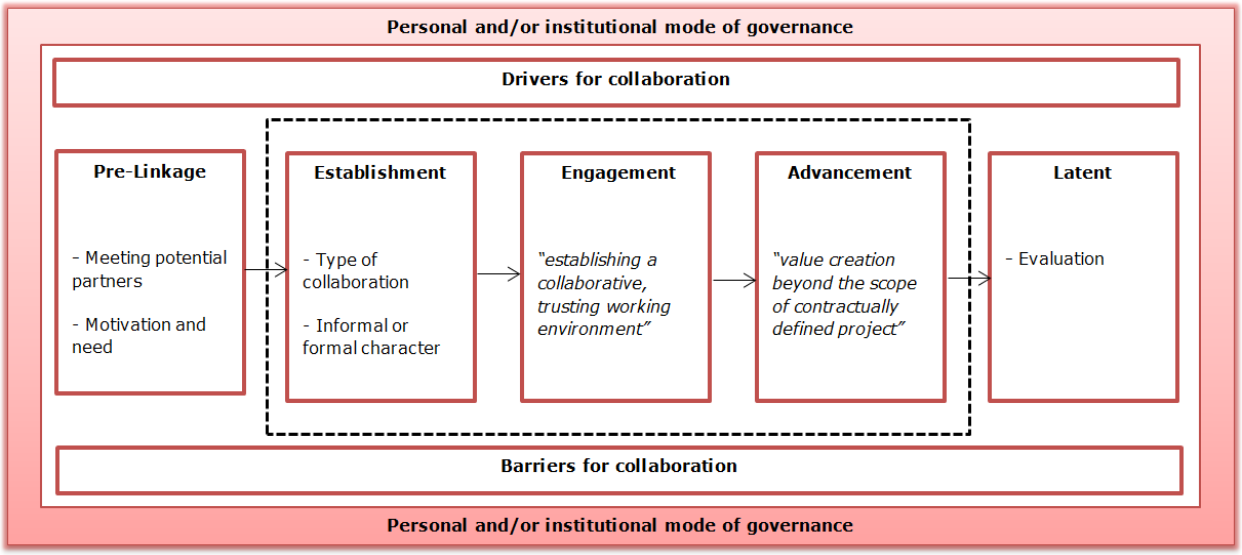


Abbildung 1. Überblick Literatur in Bezug auf Kooperationen zwischen Hochschulen und der Wirtschaft.

Teilstrukturierte Interviews wurden sowohl mit einem Vertreter des Zentrums für Unternehmertum als auch mit Dozenten für Unternehmertum an der Universität Duisburg-Essen, der Hogeschool Arnhem und Nijmegen, der Technischen Universiteit Eindhoven, der Hochschule Rhein-Waal, der Wageningen University und Research Centre, sowie der Radboud Universiteit Nijmegen geführt.

Leistungen (Performance)

Beim Blick auf die Ergebnisse der Leistungen der beteiligten Hochschulen kann schlussgefolgert werden, dass drei Arten von Hochschulen unterschieden werden können. Die erste Art von Hochschulen erreichte hervorragende Werte bei einem oder mehreren Leistungs-Indikatoren, eine andere Art von Hochschulen erreichte relativ konstant gute Werte und es gibt eine dritte Art von Hochschulen, die laut den Leistungs-Indikatoren nicht zu den leistungsstärksten Instituten gehört.

Drei Bildungseinrichtungen gehören zu der ersten Art von Hochschulen mit Unternehmertum-Kursen. Eine dieser Hochschulen hat erreichte ihre gute Leistung durch ihre ausgeprägte Weitergabe von Wissen an die Gesellschaft. Eine weitere Hochschule zeigt hohe Leistungen bei der Entwicklung von unternehmerischem Denken durch theoretische Bildung, und die dritte Hochschule zeigte besonders gute Ergebnisse bei der Entwicklung von unternehmerischem Denken durch praktische Erfahrung. Diese drei Hochschulen ergänzen einander und werden daher zusammen als Quelle der Inspiration für die Verbesserung der anderen Unternehmertum-Kurse verwendet.

Strategy (Strategie)

Während die Studie von NIRAS et al. (2008) die Bedeutung der Einbettung von Unternehmertum-Kursen im Leitbild und der Strategie der Einrichtung zeigt, ist dies nicht Thema der vorliegenden Studie. So wie es bei der Untersuchung von Blok et al. (2013) der Fall war, haben zwei der beispielhaften Hochschulen keine hohe Punktzahl bei diesem Aspekt erreicht. Daher scheint der Einbettung der (Bildung) von Unternehmertum in der Strategie nicht von großer Bedeutung für eine gute Leistung dieser Hochschulen zu sein.

Resources (Ressourcen)

Im Gegensatz zu dem Bericht für die Europäische Kommission (NIRAS et al., 2008), aber im Einklang mit Blok et al. (2013), konnten keine großen Unterschiede zwischen den Hochschulen im Hinblick auf die Verfügbarkeit von Ressourcen festgestellt werden. Im Allgemeinen sind die Hochschulen mit der Finanzierung der laufenden Unternehmertum-Kurse und der Finanzierung neuer Initiativen zufrieden. Die Verfügbarkeit von Ressourcen wird nicht als hauptsächliches Hindernis für unternehmerische Bildung wahrgenommen. Im Gegensatz zu den anderen Hochschulen generieren die beispielhaften Hochschulen ihr Einkommen durch eigene Aktivitäten.

Institutional infrastructure (Institutionelle Infrastruktur)

Hochwertige Unternehmertum-Kurse zeichnen sich durch eine ausgeprägt gute unterstützende Infrastruktur aus, zum Beispiel durch Einrichtungen, die Gründungen schon am Anfang unterstützen und ein Zentrum für Unternehmertum, aber auch durch wissenschaftliche Forschung zum Thema Unternehmertum und durch einen multidisziplinären Ansatz in der Bildung in unternehmerischem Denken. In der Regel erzielen die beispielhaften Hochschulen gute Werte beim Aspekt der institutionellen Infrastruktur.

Education (Bildungsangebot)

Der Aspekt der Bildung bezieht sich sowohl auf die Anzahl und Größe der Kurse als auch auf den Aufbau und die Inhalte der Unternehmertum-Kurse. Die beispielhaften Hochschulen unterscheiden sich von den anderen Hochschulen Bezug auf ihre experimentellen didaktischen Methoden und sie

konfrontieren ihre Studenten mit realen Problemen des Unternehmertums. Im Hinblick auf Gastvorträge, von denen angenommen wird, dass sie bei qualitativ hochwertigen Unternehmertum-Kursen von entscheidender Bedeutung sind, haben nicht alle Hochschulen sehr gut abgeschnitten.

Outreach (Zusammenarbeit von Hochschulen und Wirtschaft)

Die Ergebnisse der Studie zeigen, dass die Universitäten mit den besser abschneidenden Unternehmertum-Kursen allesamt über ein gut ausgebautes und weites Netzwerk von Kontakten mit der Wirtschaft verfügen. Darüber hinaus entwickeln sie Initiativen zur Förderung von Unternehmertum in der Umgebung der Hochschule. Die Einbindung von ehemaligen Studenten (Absolventen) in Unternehmertum-Kursen ist in den meisten der teilnehmenden Hochschulen unterentwickelt. Spin-off-Gründungen und die Lizenzierung von geistigem Eigentum stellen zwei Arten von Zusammenarbeit mit der Wirtschaft dar, welche die beispielhaften Hochschulen von den anderen Hochschulen unterscheiden.

Development (Entwicklung)

Eine wichtige Schlussfolgerung, die gezogen werden kann, ist, dass die Hochschulen (fast) überhaupt nicht in ihre Mitarbeiter investieren. Kaum ein Dozent wurde speziell geschult, um Unternehmertum-Kurse zu unterrichten. Es stehen außerdem keine oder nur geringe Mittel zur Verfügung, um das Lehren von Unternehmertum zu fördern oder anzuregen.

Die Ergebnisse zeigen einerseits, dass es viele verschiedene Wege zur Umsetzung von Unternehmertum-Kursen an Hochschulen gibt; andererseits zeigen sie aber auch, dass es noch viel Raum für Verbesserungen gibt. Schlechter abschneidende Hochschulen können von den beispielhaften Hochschulen lernen, obwohl auch bei letzteren Verbesserungsbedarf an den Unternehmertum-Kursen besteht. Das Fördern von Unternehmertum könnte zum Beispiel mehr dadurch in die Hochschulen integriert werden, dass Ziele in Bezug auf die Bildung von unternehmerischem Denken im strategischen Plan der Hochschule festgesetzt werden. Darüber hinaus ist es wahrscheinlich, dass es hochrangige Manager gibt, die bereit sind, sich in der Rolle als Vorbilder des Unternehmertums zu präsentieren. Diese hochrangigen Manager können als Vorbilder des Unternehmertums agieren und anschließend versuchen, die Aufmerksamkeit des Universitätsrats auf sich zu ziehen, mit dem Ziel, unternehmerisches Denken als zentralen Bestandteil der Hochschulbildung anzusehen. Es wird weiterhin empfohlen, den Studenten mehr Möglichkeiten zu geben, praktische Erfahrung zu sammeln. Letzteres kann durch die stärkere Nutzung der Absolventen-Netzwerke oder Kontakte mit der Wirtschaft verbessert werden, indem Gastvorlesungen organisiert werden oder Studenten an realen Aufgaben arbeiten können. Auch Spin-off-Gründungen und Lizenzierungen geistigen Eigentums scheinen zwei Möglichkeiten der Zusammenarbeit mit der Wirtschaft, die sich positiv auf die Leistungen auswirken. Dieser Bericht

bietet einige wertvolle Einblicke in den aktuellen Zustand der Förderung von unternehmerischem Denken an Hochschulen in der Euregio Rhein-Waal und kann als Ausgangspunkt für die beteiligten Hochschulen verwendet werden, um ihre Unternehmertum-Kurse zu verbessern.

Table of Contents

Executive summary - English iv
Executive summary - Nederlands viii
Executive summary – Deutsch xiii
List of Tables xxi
List of Figures xxii

1. Introduction 24
1.1 Euregio Rhein-Waal 25
1.2 Benchmarking entrepreneurship education 25
1.3 Problem statement 26
1.4 Research objective 27
1.5 Research questions 27
2. Theoretical background 30
2.1 Performance indicators 30
2.2 Dimensions of entrepreneurship education 31
2.3 HEI-industry linkages 34
3. Methodological design 44
3.1 Data collection method 44
3.2 Benchmark participants 45
3.3 Analysis 47
3.4 Ethics 48
3.5 Limitations of the study 48
4. From dimensions to questions 50
4.1 Strategy 50
4.1.1 Goals 50
4.1.2 Policies 51
4.1.3 Embeddedness 52
4.2 Resources 53
4.2.1 Allocation 53
4.2.2 Type of sources 54
4.2.3 Self-generating activities 54
4.3 Institutional infrastructure 55
4.3.1 Approaches 56

4.3.2 Cross-disciplinary structures 57
4.3.3 Research 58
4.4 Education 59
4.4.1 Education scope 60
4.4.2 Education set-up 61
4.5 Outreach 62
4.5.1 External contacts 63
4.5.2 Community engagement 64
4.5.3 Alumni 65
4.5.4 University-industry collaboration 66
4.6 Development 69
4.6.1 User-driven improvement 70
4.6.2 Evaluation of goals 70
4.6.3 Investment in human resources 70
5. Results 73
5.1 Performance 73
5.1.1 Entrepreneurial students through education 73
5.1.2 Knowledge transfer 75
5.1.3 Entrepreneurial students through practice 76
5.1.4 Overall results performance 77
5.2 Strategy 78
5.2.1 Goals 79
5.2.2 Policies 80
5.2.3 Embeddedness 82
5.2.4 Overall results strategy 83
5.3 Resources 84
5.3.1 Allocation 84
5.3.2 Types of sources 85
5.3.3 Self-generated income 86
5.3.4 Overall results resources 86
5.4 Institutional infrastructure 87
5.4.1 Approach 87
5.4.2 Research 88
5.4.3 Level of cross-disciplines 88

5.4.4 Overall results institutional infrastructure 90
5.5 Education 91
5.5.1 Education scope 91
5.5.2 Education set-up 95
5.5.3 Overall results education 97
5.6 Outreach 98
5.6.1 Links with external stakeholders 98
5.6.2 Community 99
5.6.3 Alumni 101
5.6.4 University-industry collaborations 102
5.6.5 Overall results outreach 106
5.7 Development 107
5.7.1 User-driven improvement 107
5.7.2 Evaluation of goals 108
5.7.3 Investment in human resources 109
5.7.4 Overall results development 110
6. Conclusions and recommendations 111
6.1 Overall conclusions 111
6.2 Overall recommendations 116
7. Discussion 121

References 125

Appendix 133
I: Construct, operationalization and measurement 133
II : Code scheme 134
III: Individual recommendations 141

List of Tables

Table 1. Orientation and transaction related barriers 41

Table 2. Strategy: questions questionnaire 53

Table 3. Resources: questions questionnaire 57

Table 4. Institutional infrastructure: questions questionnaire 59

Table 5. Education: questions questionnaire 62

Table 6. Outreach: questions questionnaire 69

Table 7. Development: questions questionnaire 72

Table 8. Student volume 76

Table 9. Division and share of sources of income 86

Table 10. Different types of facilities 88

Table 11. Types of education 92

Table 12. Student volume 95

Table 13. The links with external stakeholders and their contribution to the program 99

Table 14. Type of other community activities 101

Table 15. Alumni 104

Table 16. Type of collaboration, informal/formal and personal/institutional 105

Table 17. Drivers for successful collaboration 106

Table 18. Barriers for successful collaboration 107

Table 19. Types of evaluations 108

Table 20. Informal and formal evaluation of students' career, stakeholders and goals 109

Table 21. Overall average scores on the dimensions 113

Table I: Construct, operationalization and measurement 134

Table II. Strengths and weaknesses ERW1 143

Table III. Strengths and weaknesses ERW2 145

Table IV. Strengths and weaknesses ERW3 147

Table V. Strengths and weaknesses ERW4 159

Table VI. Strengths and weaknesses ERW5 151

Table VII. Strengths and weaknesses ERW6 154

List of Figures

Figure I. Overview of results desk-study about university-industry linkages viii

Figure 1. Conceptual framework 33
Figure 2. Collaboration process between university and industry 37
Figure 3. Evolution of UIL phases 38
Figure 4. Antecedents, mediator variables and outcomes of the commitment-trust theory 43
Figure 5. Overview of aspects of HEI-industry collaborations 44
Figure 6. Entrepreneurial students through education 76
Figure 7. Knowledge transfer 78
Figure 8. Entrepreneurial students through practice 79
Figure 9. Overall performance 79
Figure 10. Policy 82
Figure 11. Embeddedness 84
Figure 12. Overall scores on the dimension 'strategy' 84
Figure 13. Resource 88
Figure 14. Cross-disciplines 90
Figure 15. Overall score dimension institutional infrastructure 92
Figure 16. Traditional versus experimental education 96
Figure 17. Overall score on the dimension education 99
Figure 18. Overall score on the dimension outreach 108
Figure 19. Overall score on the dimension development 111

1. Introduction

In the Europe 2020 strategy the European Union recorded the goals and directions of European development (European Commission, 2012). Within this strategy, knowledge is considered as the engine for sustainable growth. In the creation of knowledge, entrepreneurship, education & research and innovation play an important role and are considered as key elements of the Europe 2020 strategy. Entrepreneurship is nowadays seen as one of the vital factors in stimulating economic growth (Gorman et al., 1997). There is a positive correlation between entrepreneurship and economic growth, but also innovation, technological change and employability creation correlate positively with entrepreneurship (NIRAS, 2008). Therefore, the challenge for European countries is to promote entrepreneurship in order to achieve future economic growth.

Besides economic and demographic factors (Arenius & Minniti, 2005), social capital (Davidsson, 2005; Henley, 2007) and personal skills are assumed to be necessary for being a successful entrepreneur (Arenius & Minniti, 2005). Also, research in entrepreneurship has convincingly shown that entrepreneurial experience (Baron & Ensley, 2006) and entrepreneurial education (Pittaway & Cope, 2007) have positive effects on entrepreneurial success. Furthermore, the identification and pursuit of business opportunities is identified as a distinctive feature of entrepreneurship (Gaglio & Katz, 2001; Shane & Venkataraman, 2000). The development of these entrepreneurial competencies is not only necessary if someone wants to start a new venture, but is also needed within smaller or larger companies (intrapreneurship). Higher education institutes can play a role in the development of these entrepreneurial competencies.

The role of higher education in entrepreneurship goes far beyond the delivery of knowledge to participating partners and industrial alliances. With high-tech and high growth enterprises increasingly becoming a focus of entrepreneurship-related public policies, higher education institutes are seen as an active component of the innovation policies of the European Union (European Commission, 2012). A central feature of the transition towards an entrepreneurial higher education institute is the development of an entrepreneurship education program. Following Etzkowitz' definition of the entrepreneurial university as a "natural incubator, providing support structures for teachers and students to initiate new ventures" (Etzkowitz, 2003, 112), entrepreneurship education can be seen as one of the main facilitators of these aspects of becoming an entrepreneurial university. Furthermore, the development and implementation of entrepreneurship courses and other activities which favour student attitudes towards entrepreneurship can be seen as factors that potentially facilitate the development of entrepreneurial higher education institutes (Kirby et al. 2011). Entrepreneurship education programs therefore primarily focus on the development of

entrepreneurial competencies and attitudes (NIRAS, 2008) and are being implemented all over Europe.

1.1 Euregio Rhein-Waal

The Rhein and the Waal provide in the east of the Netherlands and in the west of North Rhein-Westphalia (Germany) the gateway to both countries. Nowhere else is the economic relationship between these two countries as large as here. The Euregio Rhein-Waal can be seen as a connecting link between The Netherlands and Germany. Cooperation in the past 40 years has led to a strongly connected region and the interdependence has grown strongly in recent years. As a cross border region within the European Union, the Euregio Rhein-Waal is above all a coherent knowledge alliance made up of several universities, colleges and other research and educational institutions, as well as a wide variety of modern and innovative companies. The major challenge is to further mobilize, develop and exploit this innovation potential in a sustainable way (European Commission, 2013). The policy commitment to enhance entrepreneurship education has led to an increasing diversity of entrepreneurship education programs in higher education institutes (HEIs) within the Euregio Rhein-Waal and it is not clear which HEI is doing what.

1.2 Benchmarking entrepreneurship education

An extensive study on entrepreneurship education is used throughout this particular study, as the study by Blok et al. (2013) makes use of a benchmark study as a method for analysing the current performance of the entrepreneurship education programs and the identification of good practices. This study by Blok et al. (2013) was performed at several HEI's in the USA, Canada and Europe. Chapter 3 gives more insights in the chosen study design.

The results of the study performed by Blok et al. (2013) indicate that there are possible improvements of the dimensions when looking at the performance of several HEI's concerning entrepreneurship education. The performance is measured by three performance indicators: entrepreneurial students through education, knowledge transfer to society, entrepreneurial students through practice.

The dimensions of entrepreneurship education which can be seen as the input and throughput of the entrepreneurship education programs are also based on the report by NIRAS et al. (2008) (Blok et al., 2013). More specifically, the input which is necessary for developing and maintaining a well-functioning entrepreneurship program are: *strategy, resources and institutional infrastructure*. The throughput contains the following dimensions: *education, outreach and development*. When these inputs and processes are functioning well, the outputs (i.e. performance) are expected to be good as well.

The dimension outreach is seen as one of the important dimensions for becoming an entrepreneurial HEI (NIRAS et al., 2008) and the results from Blok et al. (2013) show that this dimension needs more in-depth insights. Acquiring entrepreneurial competences not only concerns doing theoretical exercises; offering opportunities for gaining practical experience is essential for an effective entrepreneurship education program (NIRAS et al., 2008).

Experiential learning includes the participation of students in daily practices of entrepreneurship. Pittaway and Cope (2007) state that entrepreneurship education can have an impact on awareness and perceptions of students when it includes 'real-life' learning and experiential learning. Intensive experiential learning increases self-perceived feasibility, intentions, desirability and propensity to start a venture. It also enhances creativity and positive attitudes towards entrepreneurship (Lepoutre et al., 2010). Contacts between students and entrepreneurs contribute directly as well as indirectly to the success of entrepreneurship education (Brindley & Ritchie, 2000). An example of a direct relation is when entrepreneurs act as guest lecturers in the education program. Attending guest lectures is one of the ways in which students can be confronted with real-life entrepreneurship problems. Experiential learning is also enhanced by internships or similar placements (Kirby, 1998; Westhead et al., 2000) and projects with small firms (Hollingsworth et al., 1974; Sonfield, 1981; Chan and Anderson, 1994; Brindley and Ritchie, 2000).

The dimension outreach involves links with external stakeholders in which university – industry linkages (UILs) are considered to play a central role. These links with external stakeholders can help students to become successful entrepreneurs while they are studying, but also stimulate teachers to become more entrepreneurial (Rasmussen & Sørheim, 2006). This study will zoom in on these linkages between higher education institutes and their business environment as the study of Blok et al. (2013) lacks in depth information on this dimension.

1.3 Problem statement

The study by Blok et al. (2013) shows that there are possibilities for improvement when looking at the dimension outreach. Especially the contacts with external stakeholders and alumni can and should be improved in order for HEI's to become (more) entrepreneurial. The study by Blok et al. (2013) lacks in depth information on how higher education institutes engage with external stakeholders and alumni and on the perceived obstacles or facilitators for these collaborations. If it is seen as an important factor for improving the performance (regarding entrepreneurship education) of the HEI, it should be clear in what way HEI's make use of the business environment/industry (as specific part of external stakeholders) in order to improve the entrepreneurial performance of that particular HEI. Literature provides general drivers and barriers for these linkages/collaborations with

the industry, but how these linkages relate to the entrepreneurial performance of a HEI is not clear.

In short, entrepreneurship can be seen as a way to stimulate the economy of the Euregio Rhein-Waal. The role of education to foster entrepreneurship is recognized and therefore entrepreneurship education is implemented at higher education institutes throughout the Euregio Rhein-Waal. One of the main problems that arise is that it is not clear what kind of entrepreneurship education truly fosters entrepreneurship and therefore stimulates the performance of these higher education institutes.

1.4 Research objective

This study will indicate to which extent higher education institutes (HEIs) in the Euregio Rhein-Waal facilitate in entrepreneurship education programs and, if so, in what way and how this is rooted in the organization. The performance of the several higher education institutes will be measured, using the dimensions of entrepreneurship education mentioned above. The dimension outreach will be researched upon in a more in depth way and HEI-industry linkages play a central role in this dimension. By doing this the performance of the HEI on the dimension outreach can be assessed in a better way. In addition, from a practitioner point of view, based on this research also 'good practices' on all the dimensions can be identified which is can help improve the performance of these higher education institutes. The participating HEIs are Hochschule Rhein-Waal (HRW), Hogeschool van Arnhem en Nijmegen (HAN), Radboud-Universiteit Nijmegen (RU), Technische Universiteit Eindhoven (TU/e), Universität Duisburg-Essen (UDE) and Wageningen UR (WUR).

1.5 Research questions

The research by Blok et al. (2013) shows that among the dimensions of entrepreneurship education, the dimension outreach could and should be researched upon in a more in-depth way in order to be able to give better insights in the relation between the dimension (input and throughput) and the performance (output). Therefore the first main research question is:

RQ 1: Which aspects of HEI-Industry linkages should be added to the Euregio Rhein-Waal entrepreneurship education benchmark to improve measurement of the dimension 'outreach'?

The following sub questions belong to the first main research question:

1.1 What can be defined as HEI – industry linkages?

1.2 What are drivers and barriers for HEI – industry linkages, according to the participating HEI's?

1.3 In what way can these drivers/barriers be operationalized to improve the measurement of the dimension outreach?

The second area includes performing the benchmark study, based on existing data, at the different higher education institutes in the Euregio Rhein-Waal. The research question which belongs to this part of the research is:

RQ 2: What kind of research-based educational interventions can be formulated for managers at higher education institutes in the Euregio Rhein-Waal who want to start with or improve their entrepreneurship education program?

The following sub questions are included:

2.1 What is the performance of the entrepreneurship education program of the different participating HEI's in the Euregio Rhein-Waal?

2.2 What is the relation between the input and throughput factors (dimensions) and the output factor (performance)?

2.3 What 'good practices' can be identified, which can be used to give recommendations to the participating HEI's in order to improve their performance?

2.4 What do these good practices imply for (potential/possible) research-based educational interventions the participating HEIs?

2. Theoretical background

This section gives an overview of the six dimensions of entrepreneurship education and how these dimensions affect the performance of entrepreneurship education programs. The operationalization of the dimensions and the performance indicators is given in Chapter 4.

In this benchmark study, the model of dimensions and performance indicators is developed by combining the reports for the European Commission and the OECD (Blok et al., 2013). This benchmark study includes all six dimensions included in the reports for the European Commission and the OECD. Also, literature published after the findings of Blok et al. (2013) was consulted and, where necessary, taken into account. It is therefore assumed that the model which is used in this research covers all relevant dimensions of entrepreneurship education programs of higher education institutes. Specific attention is given to the dimension outreach, focussing on HEI – industry linkages.

2.1 Performance indicators

This report uses three indicators of performance which are also used in the report for the European Commission (NIRAS et al., 2008) and in the study of Blok et al. (2013). They used three performance indicators: entrepreneurial students through learning, knowledge transfer and entrepreneurial students through practice. The reason why they chose these indicators is that fostering the right mind-set, creating entrepreneurial skills and encouraging entrepreneurship and knowledge transfer positively influences economic growth, business growth etcetera (NIRAS et al., 2008).

This implies that, ideally, one would collect data from students to analyse the entrepreneurial mind-set and conduct economic analyses to investigate the knowledge transfer. However, one can assume that entrepreneurship courses and extracurricular activities will have a positive influence on the entrepreneurial mind-set of students involved in these courses and activities (NIRAS et al., 2008). Furthermore, one can assume that knowledge transfer activities of HEIs like technology transfer offices or advisory centres will increase the performance of the surrounding business environment, which ultimately boosts the economy (NIRAS et al., 2008). This information can be obtained from the higher education institutes, and makes measurements of effective entrepreneurship education programs possible.

Entrepreneurial students through learning

The first performance indicator is measured by the share of students enrolled in entrepreneurship courses. This is measured school-wide which implies a calculation of the share of entrepreneurship students in relation to the total number of enrolments at the education institute. This is multiplied by the average number of ECTS for a course in entrepreneurship education in order to estimate the

total number of hours of attended entrepreneurship education. We have chosen to perform school-wide measurements because students from all disciplines can benefit from courses in entrepreneurship (such as intrapreneurs, artists, etcetera). Moreover, the more students get acquainted with entrepreneurship education, the more they will be triggered to perform entrepreneurial behaviour in the future (NIRAS et al., 2008), which in turn is beneficial to the economy (Gorman et al. 1997).

Knowledge transfer

The second performance indicator is measured by the number of patents/IPR, third flow of funds and peer-reviewed studies. These indicators measure the spreading of knowledge to the environment. However, it should be kept in mind that in comparison to schools for higher professional education, universities are likely to score higher on this performance indicator. Knowledge transfer is one of the main tasks of any university, but particularly schools for higher professional education give a higher priority to practice based education. However, according to NIRAS et al. (2008), the indicator knowledge transfer is essential for all HEIs. It measures to what extent entrepreneurship education is being disseminated in society, to what extent HEIs and their staff themselves perform entrepreneurial behaviour and to what extent lecturers at HEIs keep their teaching methods up to date. Therefore, this performance indicator is included in this benchmark study as well.

Entrepreneurial students through practice

The third performance indicator is measured by the number of executive education attendants and the number of students participating in extra-curricular activities. This gives an indication of the development of an entrepreneurial mind-set through practical entrepreneurial activities.

2.2 Dimensions of entrepreneurship education

This section covers the six dimensions which should be well managed in order to achieve a good entrepreneurship education program.

Strategy

Entrepreneurship education programs involve a lot of actors and stakeholders. This aspect is likely to contribute to the success of a program. Because entrepreneurship education is not a 'one man band', the cooperation and coordination of multiple actors within the institution and its surrounding environment is essential for establishing an effective entrepreneurship education program. According to NIRAS et al. (2008) and Hoffmann et al. (2004), embedding entrepreneurship education in the strategy of an HEI helps to promote the cooperation of the different actors within and outside the institution. According to Vesper and Gartner (1997), strategy and more specifically strategy and operational planning can act as a road map for successful entrepreneurship education programs.

NIRAS (2008) and Hoffmann et al. (2004) therefore use strategy as a dimension of entrepreneurship education. This condition concerns how and if institutions embed entrepreneurship in their overall strategy (NIRAS et al., 2008, p. 45). It is the one dimension which explains the difference between front-runner institutions and the ones that lag behind. Moreover they state that "the strategic dimension must be considered of crucial importance if higher education institutes want to fulfil the ambition to become entrepreneurial" (NIRAS et al., 2008: 91).

Resources

In order to develop and establish an entrepreneurship education program, dedicated funds are needed (NIRAS et al., 2008; Vesper & Gartner, 1997). The number, sources and availability of resources over time influence the development and establishment of the education program in direct and indirect ways. Without available resources, research in entrepreneurship, the training of teachers in entrepreneurship etc. is impossible (Vesper & Gartner, 1997).

Institutional infrastructure

Like all education programs, the entrepreneurial education program should be supported by an environment and facilities which are conducive to learning. Examples are the availability of a centre of entrepreneurship or incubator facilities for students and postgraduates. Technology transfer offices stimulate knowledge valorisation and knowledge transfer (Etzkowitz, 2003). These institutional infrastructures are especially important in entrepreneurship education. Not only because the stimulation of entrepreneurship places a greater demand on such (expensive) facilities compared with other education programs, but also because the didactic methods which are used in entrepreneurship education require smaller groups of students (Garavan & O'Cinneide, 1994).

Education

Education is a dimension which directly influences the competences of students. Students gain knowledge about entrepreneurship in a direct way through education (Souitaris et al. 1997). Moreover, by means of education, one can influence attitudes (Lepoutre et al. 2010) and intentions and ultimately the entrepreneurial behaviour of students (Souitaris et al. 2007). According to Vesper and Gartner (1997), entrepreneurship courses are the number one indicator for excellent entrepreneurship education programs. Not just the quantity of entrepreneurship courses is an important indicator for the performance of an entrepreneurship education program, but also its logic, coherence and the efficacy of educational experience should be measured when comparing entrepreneurship education programs (Gartner & Vesper, 2007).

Outreach

Acquiring entrepreneurial competences not only concerns doing theoretical exercises. Offering opportunities for gaining practical experience is essential for an effective entrepreneurship education program (NIRAS et al., 2008). The dimension outreach involves links with external stakeholders. These links positively affect the performance indicators entrepreneurial students through practice (NIRAS et al., 2008) and knowledge transfer (Etzkowitz, 2003). Furthermore, these links with external stakeholders can help students to become successful entrepreneurs while they are studying (Rasmussen & Sørheim, 2006).

Development

The sixth dimension, development, is beneficial to the performance of an entrepreneurship education program for the obvious reason that aiming for development leads to improvement. By regular evaluation of the education program and investments in human resources by training etc., the entrepreneurship education program will be further developed and improved (NIRAS et al., 2008; Vesper & Gartner, 1997). It is expected that high-levels of development will lead to higher performance of the entrepreneurship education program.

Conceptual framework

To show how the dimension mentioned above influence the performance indicators, a conceptual framework was built (see Figure 1), which shows the direct links between the dimensions and the indicators.

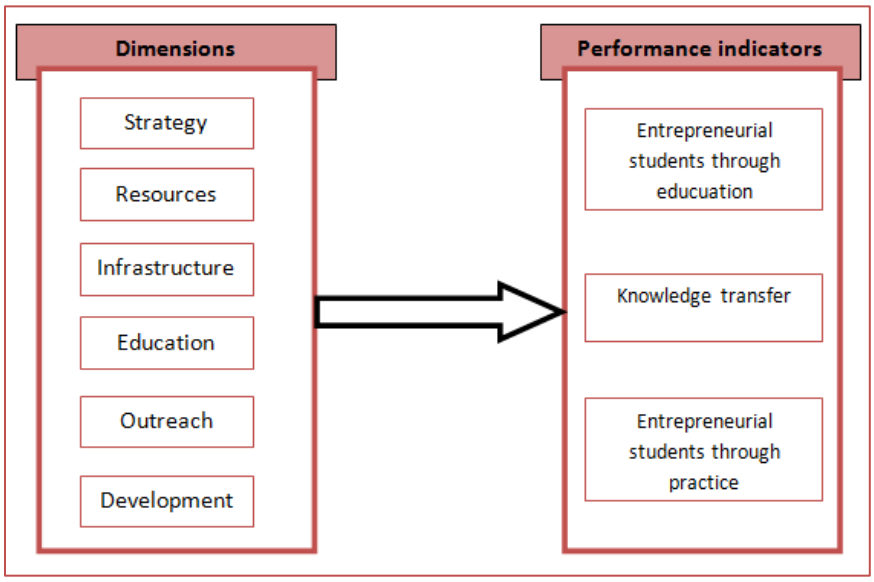


Figure 1. Conceptual framework of the dimensions of entrepreneurship education programs and the performance indicators

2.3 HEI-industry linkages

This chapter includes the literature review on the linkages between higher education institutes (university) and the business environment (industry). As a result of this literature review additional questions for the dimension outreach will be developed and added to the existing questionnaire. As mentioned in the previous chapter the dimension outreach covers three indicators (external stakeholders, community engagement and alumni) and in this chapter another indicator is added to the dimension outreach namely 'industry collaboration'. In some way this is partially measured in the indicator 'external stakeholders', but the information to be gained from this indicator does not provide enough in depth information. At the end of this paragraph a overview is presented, which combines important aspects of the literature review on HEI-industry linkages.

Motives for HEI – industry collaborations

In recent years there has been a shift towards a more knowledge-based economy, which has led to a change in the nature of the relationship between universities and the industrial environment. University-industry linkages (UILs) changed from a sponsorships structure (one way relationship in the form of financial support) towards a partnerships structure, in which a bi-directional relationship emerged (Plewa and Quester, 2007). The following definition of university-industry linkages is adapted in this study: "UILs are bi-directional linkages between university[1] and industry[2] entities and are established to enable the diffusion of creativity, ideas, skills and people with the aim of creating value over time" (Plewa and Quester, 2007, p. 371).

The on-going pressure to innovate has driven the development of formal and informal relationships among research institutes, such as universities, universities of applied sciences and commercial organizations (Perkmann and Walsh, 2007). Research institutes actively engage in research with commercialization potential, which attracts greater funding, but also enhances the entrepreneurial atmosphere at the institution itself (Plewa et al., 2013; Etzkowitz, 1996). Industry on the other hand increasingly recognizes the value that university knowledge can add to commercial R&D (Plewa et al., 2013). Research collaborations between the industrial sector and universities allow knowledge transfers in both directions and significantly affect regional economic productivity and enhance entrepreneurship (Mueller, 2006).

Research on motives to engage in university-industry relations shows that the motives vary within and between businesses and universities. For example Perkmann & Walsh (2007) argue that the motives are commonly not restricted to generating and having access to readily

1 In this report the term 'university' also refers to university of applied sciences.

2 Industry refers to private companies and entrepreneurs

commercializable innovations: “various studies indicate that firms’ motives for engaging in university–industry links are informed by generic benefits such as accessing students, gaining ‘windows’ on emerging technologies and enhancing their knowledge base rather than by the desire to develop specific commercializable innovations” (Perkmann & Walsh, 2007, p. 267). Collaboration between businesses and scientists may for example arise for R&D purposes: businesses collaborate with universities in an attempt to cut R&D costs, have access to technologies and knowledge that may positively influence their competitive position in the market place, and support the transfer of technology and knowledge (Yusuf, 2008; Elmuti et al., 2005). Another reason for having links with the industry is that the voluntary support of entrepreneurs increases the quality of the entrepreneurship education program without using financial resources allocated to the education (Rasmussen and Sørheim, 2006). The knowledge of business people and entrepreneurs keeps the education up to date and relevant and entrepreneurs can act as role models and have a network which might also be of use to students and the research institute (Rasmussen and Sørheim, 2006). Additionally, businesses can hire graduates who participated in the university-industry collaboration (Santoro & Betts, 2002). Since there are many different motives for universities to collaborate with industry, it seems only logical that there is not just one way of collaborating with each other to match the motivation and need to collaborate.

Types of HEI-industry linkages

There are many different types of linkages between universities and the industry. The relationship between businesses and universities is not necessarily displayed in the form of joint research collaboration, but can also consist of recruitment of graduates or postgraduates, student placements (Bruneel et al., 2010), informal interactions in meetings and at conferences, consultancy and contract research performed by the university, spin-off creation, creation of physical facilities (funded by industry) or training (postgraduate training in business or training of company employees) (D’Este & Patel, 2007). Also licensing of university intellectual property for commercial purposes to joint R&D activities is one of the many forms of university-industry linkages (Plewa et al., 2013). Ramos-Vielba and Fernández-Esquinas (2011) argue in their study on exploring multiple forms of university-industry linkages, that some of the types of collaboration need more intensive contact and add more to the knowledge transfer of the higher education institute. They state that collaborations like spin-off creation and the licensing of intellectual property rights mean a further stage based on previous university–industry interactions and have a larger impact on knowledge transfer (Ramos-Vielba and Fernández-Esquinas, 2011). Moreover, they also indicate that researchers involved in intellectual property rights are also significantly more involved in different types of collaborations.

The university-industry collaboration process

University-industry linkages are not static facts, but evolve over time an may represent themselves in different states or phases in time. Research focuses on the dynamic and evolutionary nature of relationships and offers several conceptual models to describe the evolution/development of different types of relationships (Plewa et al., 2013). Many evolution models, commonly divided into stages and states theories (Rao and Perry, 2002), rely on the social exchange theory (Blau, 1986). The social exchange theory states that actors evaluate their contributions and the outcomes of an initial interaction to determine the extent of future interactions and whether they will develop relational norms, trust and other relational success drivers.

Stage models explain the change and evolution inherent in relationships, underpinned by the notion that partners move through a series of stages, such as awareness, exploration, expansion, commitment, and dissolution (Plewa et al., 2013). Challengers to stages theory note that change is a nonlinear dynamic process and that relationships grow in qualitatively different speeds and patterns (Tikkanen and Tuominen, 2000). In contrast to stages theory, states theory argues that different relationships can develop between any states or stay at one phase for an undetermined period of time (Rao and Perry, 2002), which reflects the complex and unpredictable nature of relationships and their development over time.

Elmuti et al. (2005) describe a university-industry collaboration model in which different phases of collaboration are discussed and represents an example of a state theory model. According to Elmuti et al. (2005), the university-industry collaboration process begins with the identification of the benefits from the collaboration for each party, as well as the needs of the other party. Subsequently, the collaboration is prepared by defining different factors (e.g. the mission of the collaboration) and organizational activities take place, see Figure 2. The collaboration activities will then be implemented and eventually evaluated. Even though this model can be used to analyse process steps in the collaboration process, it lacks some valuable insights which the model of Plewa et al. (2013) can provide new insights in addition to the model of Elmuti et al. (2005). Both models have a dynamic, nonlinear, situation-dependent nature, which is taken into account in states theories. The additional value of the model by Plewa et al. (2013) lies in describing the phases in a more distinctive way and presenting success related outcomes, which are not present in the model of Elmuti et al. (2005).

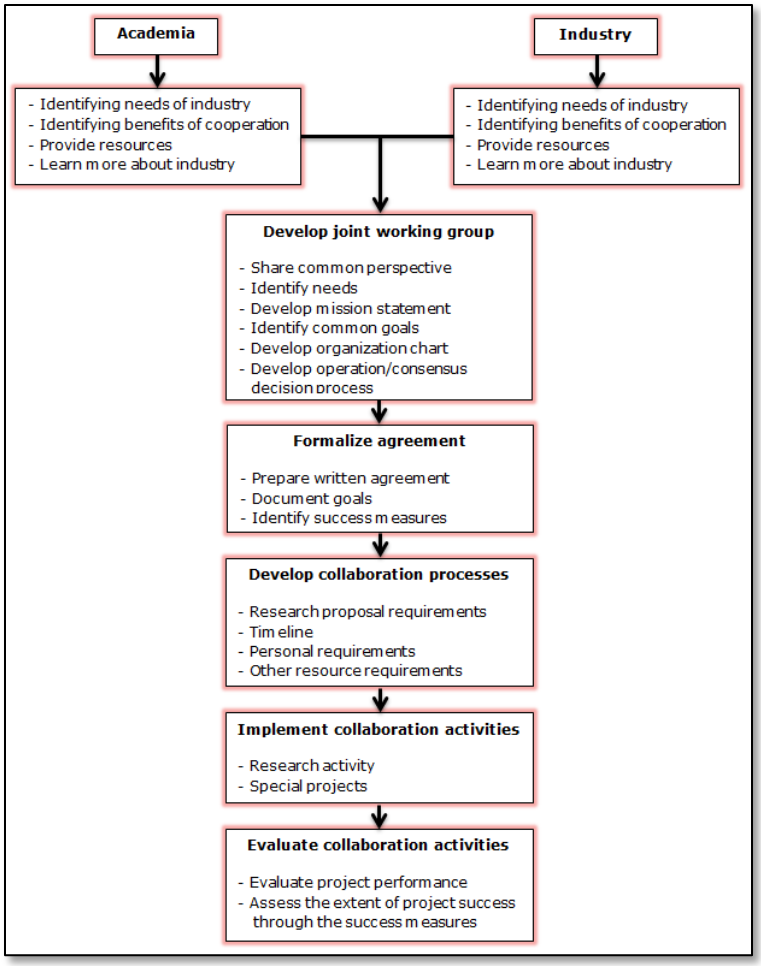


Figure 2. Collaboration process between university and industry (derived from Elmuti et al., 2005)

The model of Plewa et al. (2013) identifies five different relationship phases, which can be seen in figure 3. Parts of the model by Plewa et al. (2013) are also visible in the model by Elmuti et al. (2005). The model of Plewa et al. (2013) is used as the main example in which elements of the model by Elmuti et al. (2005) is included. The first phase *pre-linkage* entails the identification of individuals, teams or institutes as potential partners. There is a wide range of options for meeting potential partners such as open forums (conferences, workshops and symposiums), referrals from colleagues and internet searching (Easton, 2010). In this phase there is a lot of uncertainty when the partners have not worked together in the past, therefore, the reputation and the existing networks of the persons involved determine UIL initiations. This first phase concludes with discussion related to a concrete project among the potential partners. In the second phase called *establishment* the discussions continue to take place. At this stage both partners discuss their strengths, needs and interests, but also their expectations and deliverables related to the project. As a result from the negotiations in this stage a mutual agreement will be made and in most cases a contract will be signed. In phase three - *engagement* - the partners are actively working on the project and involves

the development of processes and mechanisms that enable the establishment of a collaborative, trusting working environment. The timeframe and the deliverables of the project are the two factors which determine the end of this phase. Feeling a part of the team and engaging in value creation beyond the scope of the contractually defined project are key concepts of the next phase called *advancement*. This phase is about sustaining the relationship and engaging in new formal as well as informal projects. The *latent phase* can occur after each and every one of the steps mentioned before, depending on the circumstances. It may result in that the personal engagement present in this phase leads to future collaborations, but it is also possible that there is a lack of desire for continuous or future engagement, which could lead to the ending of the relationship.

To make these distinguished phases in university-industry linkages a success (i.e. have a positive outcome) four drivers are identified by Plewa et al. (2013). These drivers, among other identified drivers, will be discussed later on in this paragraph. So, in addition to the model of Elmuti et al. (2005), the model of Plewa et al. (2013) is also used in this study.

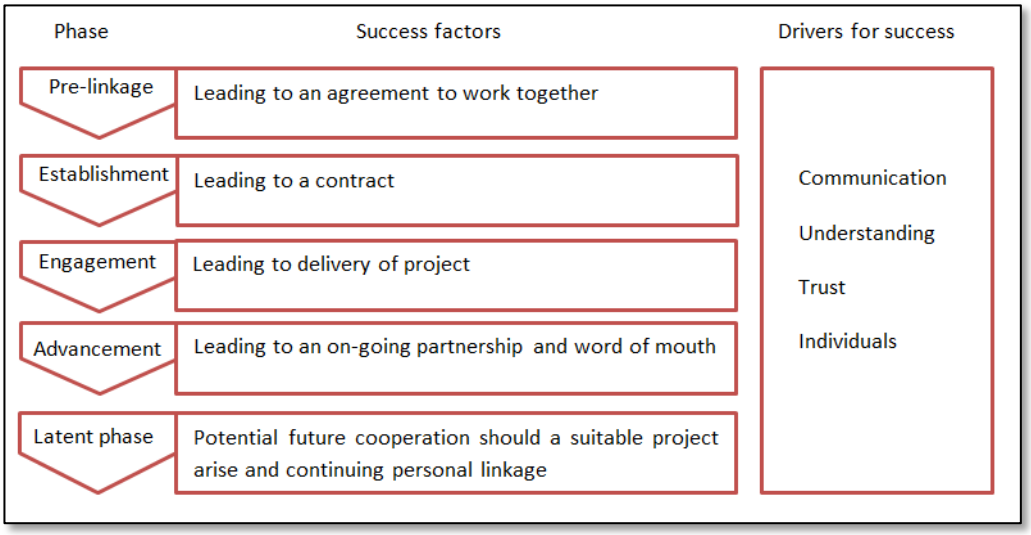


Figure 3. Evolution of UIL phases (derived from Plewa et al., 2013)

Modes of governance

Interactions between universities and the industry can take place on different levels. When discussing UIL governance, two types of modes of governance are important to consider. Most of the research focuses on the institutional mode of governance, whereas much fewer studies focus on the personal mode of governance (D'Este and Patel, 2007). The personal mode of governance refers to direct (contract-based) arrangements with university researchers. This in contrast to the institutional mode which refers to formal relationships and contracts with an university, usually mediated by administrative structures such as faculty departments or dedicated knowledge transfer organizations (Bodas Freitas et al., 2013, D'Este and Patel, 2007). As mentioned before most research does not take

into account this personal mode and therefore misses information on the real number of linkages with industry within an university. Often it is assumed that personal interactions are informal (not regulated by a contract) and do not occur in a formal way without the mediation of the university, but the study by Bodas Freitas et al. (2013) shows in a study conducted in Italy, that almost 50% of the interactions between university and industry is based on the personal mode of governance. In addition to this, personal interactions also appear to stimulate regional knowledge transfer and diminish the possible transaction costs involved in setting up personal contractual relationships compared to establishing institutional arrangements (Bodas Freitas et al., 2013, D'Este and Patel, 2007). This implies that both modes of governance co-exist and the personal mode of governance should not be neglected in research. In turn, this has an effect on how the previously mentioned models can and should be interpreted. Both models can be interpreted on an institutional level and on a personal level, depending on the mode of governance. The process steps remain the same, but the content of the different steps changes when differentiating between institutional and personal modes of governance. For example when considering the personal mode of governance, discussions about a formalized agreements might go more smoothly, than when considering the institutional mode. Because in the personal mode direct contract-based arrangements are made with the researcher, instead of arrangements being mediated by administrative structures in the institutional mode.

Barriers to university-industry collaborations

As mentioned in the text above collaborations between industry and higher education institutes might face some challenges. While HEI's are primarily driven to create new knowledge and to educate, private firms are focused on capturing valuable knowledge that can be used as a competitive advantage (Dasgupta and David, 1994). This difference in the nature of both parties causes, next to synergies and success, possible points of conflicts when these two parties collaborate with each other (Bruneel et al., 2010). The available literature is quite limited concerning the identification of barriers within industry/university collaborations as well as explaining how these barriers can be reduced (Hall et al., 2001; Bruneel et al., 2010).

"At the core of the obstacles to university-industry collaborations are the different institutional norms governing public and private knowledge" (Dasgupta and David, 1994 in Bruneel et al., 2010, p. 859). The creation of reliable and public knowledge has been central to the growth of educational organizations. These institutional norms are fundamental to the way that many academics perceive and perform their work. In contrast to the relatively open nature of the science system, the process of knowledge creation in the private sector is dominated by attempts to gain competitive advantage (Bruneel et al., 2010). This more or less 'private' knowledge is largely closed and remains hidden

within the firm. These conflicts of interest may cause problems in the collaboration process between a university and the industry. Brown and Daguid (2000) call this conflict between public and private knowledge, a matter of leaky versus sticky knowledge. Where academics wish to create 'leaky' knowledge, so that their ideas can be acknowledged by their peers, firms want the knowledge to be 'sticky', so that they can control a resource that is not available to their competitors.

Other potential conflicts which may occur within university-industry collaborations vary from communication difficulties (different working cultures, languages and values) (Kock et al., 2000), to differences in objectives and the perception of goal achievement (Elmuti et al., 2005). University researchers are also likely to choose research topics that are perceived by their peers to be interesting and valuable, while firms are likely to choose topics and problems that are perceived as being valuable for the development of new products and services for their customers (Nelson, 2004). This means that the problems that each party may want to explore within a research project may be very different and the types of outputs each partner is interested in may also diverge (Bruneel et al., 2010). Uncertainty may also play a role in being an obstacle for successful collaborations between university and industry. When the collaboration includes many unknowns, such as not knowing each other's expectations or preferred type of outputs, uncertainty arises, which might complicate smooth and successful collaboration (Hall et al, 2003). According to Bruneel et al. (2010), many other types of (university) barriers exist which influence university-industry collaboration: the orientation of the university and its researchers (research oriented), the long-term orientation of the university, attitudes and behaviour of university administration and the Technology Transfer Office, and IP-related barriers and administrative procedures. Another possible barrier for the continuation of the collaboration after the first agreement lies in the possibility of not getting the results which were hoped for beforehand. The research might generate results which are conflicting with the claims a business would like to prove (or disprove for that matter) (Santoro and Betts, 2002). This again has something to do with the differences in institutional norms of the different organizations. And finally the university's attempt to obtain commercial benefits from research might also lead to being a barrier for successful collaborations; universities often have unrealistic expectations about the commercial potential (Clarysse et al., 2007).

Bruneel et al. (2010) focus in their study on a division between 'orientation-related barriers' (barriers associated with orientation and incentives differences between businesses and universities) and 'transaction-related barriers' (barriers associated with IP conflicts and dealing with university administration procedures), as shown in Table 1 . Furthermore, Table 1 shows the type of barrier (orientation or transaction) related to the specific description of that barrier. The study shows that transaction-related barriers are considerably more difficult to overcome than orientation-related

barriers; that "prior experience of collaborative research lowers orientation-related barriers and that greater levels of trust reduce both types of barriers"; and that "breadth of interaction diminishes the orientation-related, but increases transaction-related barriers" (Bruneel et al., 2010, p. 859). The next paragraph explores the possible drivers for university-industry collaborations.

Table 1. Orientation and transaction related barriers (derived from Bruneel et al., 2010)

Type	Barrier
Orientation related barriers	University research is extremely orientated towards pure science Long-term orientation of university research (concerns over lower sense of urgency of university researchers compared to industry researchers) Mutual lack of understanding about expectations and working practices
Transaction related barriers	Industrial liaison offices tend to oversell research or have unrealistic expectations Potential conflicts with university regarding royalty payments from patents or other IP rights and concerns about confidentiality Rules and regulations imposed by universities or government funding agencies Absence or low profile of industrial liaison offices in the university

Drivers for university-industry collaborations

A particular area of interest involves the factors that drive university–industry collaborations. *Trust and communication* characterize the interactions between partners (Plewa et al., 2013; Bruneel et al., 2010; Boehm et al., 2013). Trust between partners is important, due to the inherent risks of joint research, lack of familiarity with the university/industry culture and the tendency for legal contracts that limit flexibility (Blomquist et al., 2005). Frequent communication and thus the development of common knowledge platforms and an understanding of each other's aims, creates the foundation for successful university-industry collaborations (Plewa et al., 2013). In turn, these relational success factors depend strongly on the individual actors within UIL (Bush et al., 2001; Santoro and Chakrabarti, 2002), whose ongoing *personal interactions* can help overcome the complexities of the research and the implied need to explain results (Plewa et al., 2013). Bruneel et al. (2010) describe in their study that there are some factors that can diminish the barriers to a successful collaboration. The mention three possible factors: experience of collaboration, the breadth of interaction channels and inter-organisational trust. The experience of collaboration refers to having certain routines and practices built by previous collaborations, which might help overcome problems in future collaborations. Engaging in a broad range of interaction channels (different types of linkages) creates opportunities for organizational learning by exposing the university and industry to formalized and non-formalized interactions; face-to-face and arm's-length interactions; and short/targeted and long-term/open-ended interactions. There are substantial synergies between these channels: while casual face-to-face and short-term interactions may not require a formalized-contractual relationship, they are crucial to improving the effectiveness of formal, long-term research agreements (Kogut, 2000). Therefore, "engagement in a wider range of interaction channels with industries may enable the

convergence of attitudes between the two parties in the exchange, helping to overcome misalignments due to distinct institutional norms" (Bruneel et al., 2010, p. 861).

As trust appears to be one of the main drivers of successful university-industry collaborations, the concept of trust is researched upon more closely. Trust in this respect means that partnering organizations are willing to share their strategic information regarding costs, forecasts, risks and rewards, etc. (Wubben et al., 2012). Contracts provide an alternative for trust to organise inter-organisational relationships and administer governance structures. Formal governance formats can be found in contracts and/or shared equity, while social governance formats can be realised by building trust and relational alignment between partners (Wubben et al., 2012)

A common used trust theory is called the commitment-trust theory. Since Morgan and Hunt (1994) proposed the commitment-trust model, many researchers have probed into various trust and commitment related issues. Morgan and Hunt (1994) state that relationship marketing refers to activities directed toward establishing, developing and maintaining successful relations. More recently, there has been a growing interest in what factors contribute to such long-term successful exchanges between business associates. In social exchange theory, which has for example successfully been applied to studies of marital satisfaction and family life quality, it is proposed that relationships providing more rewards than costs will yield enduring mutual trust and attraction (Friman et al., 2002). The theory further asserts that the actions of individuals are motivated by the reward (not necessarily monetary) that these actions are expected to bring from others. For example, in a business-to-business relation, one partner provides another with resources and support, while, in exchange, the other part contributes monetary rewards. Thus, whether or not commitment and trust emerge between the exchanging partners is a function of the perceived costs or the rewards one expects at a later date from the relationship exchange (Friman et al., 2002). This commitment-trust theory is commonly used in relationship marketing and supply chain partnership research, but might also be suitable for analysing university-industry collaborations as these collaborations also aim for on-going sustainable relationships between partners. Figure 4 shows how trust and commitment are built by some antecedents and in what relationship commitment and trust can result in.

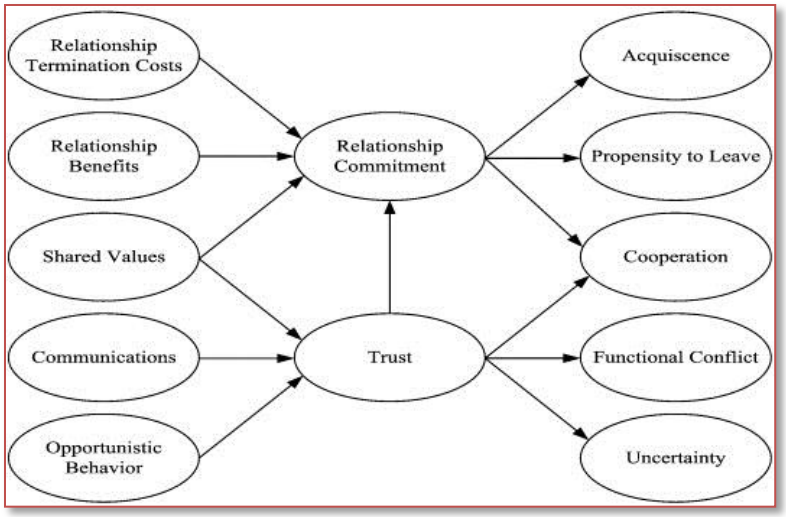


Figure 4. Antecedents, mediator variables and outcomes of the commitment-trust theory. (Derived from Wu et al., 2012)

Overview university-industry collaboration

Combining all elements of the literature research on HEI-industry linkages results in the framework which is given below (Figure 5). The model shows that the mode of governance influences all process steps and defines how to interpret them. Furthermore, the model shows the steps taken by the university or industry before the actual interaction takes place in the phase pre-linkage (input), the process variables such as the establishment of the collaboration (throughput) and the final 'stage' of continuing the collaboration in the latent phase (output). All the phases are influenced by drivers and barriers for successful collaboration.

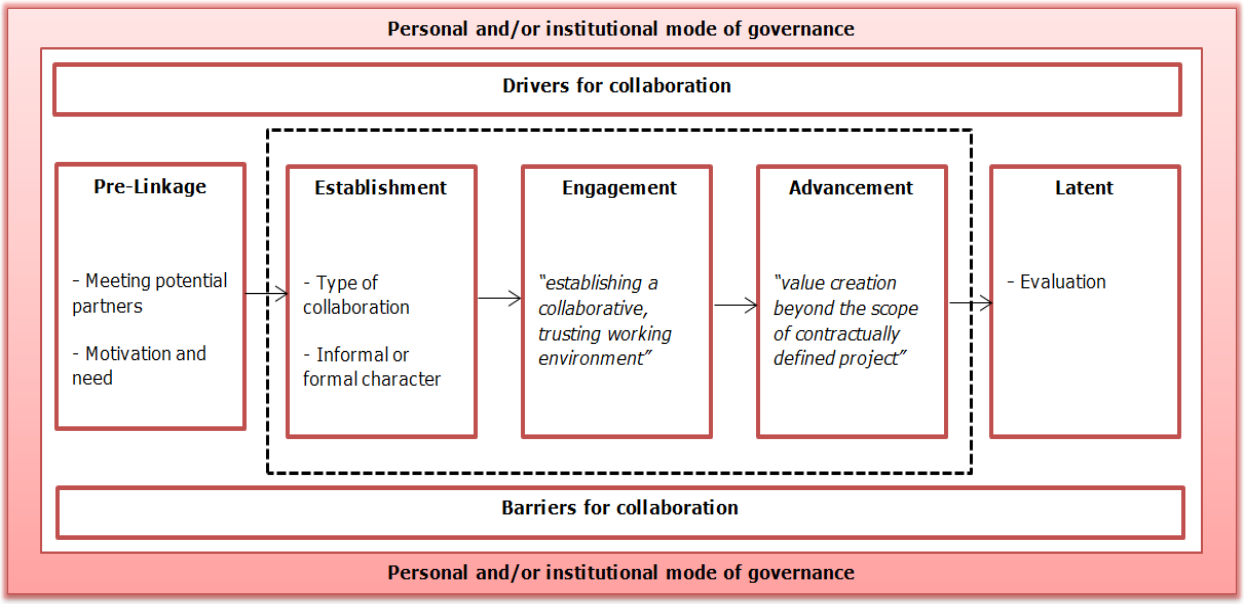


Figure 5. Overview of HEI-industry collaborations

3. Methodological design

Besides making use of a literature review on university-industry linkages, the principle of the benchmarking method used in this study is to identify good practices by linking performance indicators to the input that leads to a higher performance; the so-called dimensions of entrepreneurship education. This benchmark study applies the definition of benchmarking made by Jackson and Lund (2000), which is also used in the benchmarking research of Australian universities by Garlick and Pryor (2004). The definition of benchmarking used in this report is the following:

'Benchmarking is, first and foremost, a learning process structured so as to enable those engaging in the process to compare their services/activities/products in order to identify their comparative strengths and weaknesses as a basis for self-improvement and/or self-regulation' (Jackson & Lund, 2000; 6 in Garlick & Pryor, 2004).

There are several methods of benchmarking (Carpinetti & de Melo, 2002; Andersen & Pettersen, 1996; Kyrö, 2003; Mc Adam et al., 2008; Freytag & Hollensen, 2001). Some benchmark methods focus on the final product or output, others on inputs or the throughput, i.e. the processes between input and output. It is hard to classify this benchmark study in one particular benchmark category, because all three focus points are involved in entrepreneurship education programs. However, entrepreneurship education programs do have a final product, namely the outputs of entrepreneurship education. This final product is the result of inputs and processes. These outputs are the previously mentioned performance indicators (entrepreneurial students through education, knowledge transfer to society, entrepreneurial students through practice).

The dimensions of entrepreneurship education which can be seen as the input and throughput of the entrepreneurship education programs are also taken from the report by NIRAS et al. (2008) (Blok et al., 2013). The input which is necessary for developing and maintaining a well-functioning entrepreneurship program are: *strategy, resources and institutional infrastructure*. The throughput contains the following dimensions: *education, outreach and development*. When these inputs and processes are functioning well, the outputs (i.e. performance) are expected to be good as well. So, there are six dimensions of entrepreneurship education which affect the performance of an entrepreneurship education program.

3.1 Data collection method

If the partners were willing to contribute to the benchmark study, interview appointments were scheduled with the head of the entrepreneurship education program and, if possible, a (senior) lecturer involved in entrepreneurship education. Subsequently, a content analysis of the strategic

plan, mission statement and financial plan of the participating HEIs was executed, as well as an analysis of the course manuals of courses related to entrepreneurship.

The questionnaire was sent to the participants approximately one week before the interview so they could prepare the questions. The heads of the entrepreneurship program received all questions which need to be answered. The lecturers received only those questions which relate to the execution of the education program. The interviews were preferably conducted face-to-face. The interviews are semi-structured, i.e. there are closed questions asked during the interview and subsequently probing questions when necessary. This method of follow-up questions was used when answers were vague or ambiguous, or explanations of specific answers were needed. Also when more specific or in-depth information was needed, this interview technique was used. Probing questions yielded information about the entrepreneurship program which was relevant enough to be included in this report. It could be helpful for the interpretation of the quantitative results and therefore contributes to the validity of this study.

If the respondents were not able to answer all the questions immediately, a date was set before which the missing answers had to be provided. The interviews were recorded in order to be able to make written transcripts. This makes it possible to provide quotes selected from the respondents' answers. When major inconsistencies were identified between the interviewed representatives of an HEI and/or between the interviews and content analysis of the written information, the head of the entrepreneurship education program was asked to validate the given information of the HEI. When minor inconsistencies were identified –e.g. a difference of 1 on a 5 point scale -the answer of the representative who is assumed to be the expert was adopted. In case of inconsistencies regarding courses and didactic methods, the answers of the representative involved in education was adopted. In case of inconsistencies regarding resources or the institutional infrastructure, for instance, the answer of the head of the centre of entrepreneurship was adopted.

Moreover, the benchmark participants received the results of the draft version of the report in order to verify the data presented. Results which are not correctly presented in the draft report were reviewed and adjusted when appropriate.

3.2 Benchmark participants

In this benchmark study several higher education institutes (HEIs) in the Netherlands and in Germany were assigned to participate (because of their involvement in the project 'Wissensallianz 2020'). These HEIs are all located within the Euregio Rhein-Waal, but have different focusses. This means that the HEIs involved in the benchmark study have different backgrounds (agri-food, technical or more focussed on (medical) care). It should be kept in mind that this could have an intermediate

effect on the results, as the nature of the higher education institute could be a factor which influences the performance. There are also two HEIs which have been researched upon in the previous benchmark study performed by Blok et al., 2013. The results of these interviews are also used for this benchmark study, which could imply that some results are a little bit outdated.

The main characteristics of the participating HEI's are explained below:

- Hogeschool van Arnhem en Nijmegen (HAN)

  The Netherlands

  Interviews: 12-03-2013 and 20-03-2013; face-to-face.

  General information: The HAN invests in education and research. From campuses in Arnhem and Nijmegen provides the HAN for over 30,000 students more than 85 bachelor's and master programs. The synergy between education and research is a major focus. The focus is furthermore on life sciences, education and society.
- Wageningen University and Research centre (WUR)

  The Netherlands

  Interviews: 21-06-2011 and 30-06-2011; face-to-face

  General information: In 1876 an agricultural college was founded. In 2011, the university had about 6,500 students in both natural and social sciences. Five different science groups operate in the three core domains: food and food production, the living environment, and health, lifestyle and livelihood.
- Technische Universiteit Eindhoven (TU/e)

  The Netherlands

  Interview: 15-08-2011; face-to-face

  General information: The technical university was founded as the technical school of Eindhoven in 1957 and became a technical university of Eindhoven in 1986. The university is located in the Brainport area, the heart for technical incubation in the Netherlands. The university teaches engineering science and technology, in nine faculties.
- Radboud University Nijmegen (RU)

  The Netherlands

  Interview: 14-05-2013; face-to-face

  Genral information: Radboud University Nijmegen is situated in the oldest city in the Netherlands. It has seven faculties and enrols over 19,000 students. The University has also strong links between education and research, creating a community of academic learning in which students can become independent thinkers. One of our distinguishing hallmarks is our

emphasis on interdisciplinarity. The current size of the University and its academic breadth provide the conditions for interdisciplinary co-operation.

- Universität Duisburg – Essen (UDE)

  Germany

  Interview: 16-04-2013; face-to-face

  General information: Creative inspiration between Rhine and Ruhr: the University of Duisburg-Essen (UDE) is located in the European region with the highest density of institutions of higher learning. Created in 2003 by the merger of the universities of Duisburg and Essen, the UDE is the youngest university in North Rhine-Westphalia and one of the ten largest universities in Germany. The UDE is one of the 40 universities in Germany with the strongest research profile. Research activities are concentrated in five main research areas: Fundamentals and Applications of Nanotechnologies, Biomedical Sciences, Urban Systems, Empirical Research in Education, and Change of Contemporary Societies.

- Hochschule Rhein-Waal (HRW)

  Germany

  Interviews: both on 13-05-2013; face-to-face

  General information: The university has two modern campuses: The Kleve campus and the Kamp-Lintfort campus. Here, 5.000 students find everything they need for their everyday university life close by: lecture halls, seminar rooms and space for work placements, language centres, university libraries, university refectories and halls of residence. At the Rhine-Waal University of Applied Sciences, you are able to study natural scientific, business/economics-scientific and engineer scientific research areas as well as social sciences and health sciences - we offer a total of 25 undergraduate degree programmes and four postgraduate degree programmes.

3.3 Analysis

As the results of the benchmark study are both quantitative and qualitative, two different types of analysis are presented here. The interviews were transcribed in order to filter useful information. Quotes from the participants can be useful to endorse important in-depth information. The results from the interviews give direction to the results from the questionnaire. They give meaning to the facts and figures presented in the questionnaire. Therefore a quick content analysis was performed to extract valuable extra information. Also when analysing the more quantitative results, the explanations given in the interview serve as background information and are necessary for understanding the results of the questionnaire. The results from the questionnaire were coded into a

5 point parametric scale. This was done for most of the questions, in order to be able to compare the results. Where possible a 5 point scale was used as answer category, if this was not possible a different scale was used. The coded answers were used to make tables and figures of the gathered data and to measure the performance. The code scheme is presented in Appendix I.

3.4 Ethics

It is important to make sure the results are handled with care and that the respondents can participate anonymously. This gives the respondents room to give honest answers and bias the results less than when socially desirable answers are given due to feelings of exposure. The names of the participating HEI's are transformed into a code, this ensures their anonymity. The participating HEIs received their own results in a separate document, which is only available for that particular HEI. Thereby the participants were reminded throughout the interview that the benchmark study could help them improve their own education program and that it is not about ranking different higher education institutes, but about learning from each other. This reduced the potential bias of overestimating their own performance and risk of social desirable answers.

3.5 Limitations of the study

The benchmark method is a method in which the identification of the best practice is important. With the questionnaire and the interviews, the performance of the entrepreneurship education program and the specific inputs which lead to the performance – the so called dimensions – are measured. However, there might be a tendency of benchmark participants to give answers which might overestimate their performance, in order to become the best practice. To prevent this tendency, respondents were asked to elaborate on their answers during the interviews. Furthermore, inconsistencies between respondents of one HEI and/or between the interviews and the content analyses of the written information were double checked. This means triangulation is used in order to prevent these type of inconstancies. Besides making use of the information gained from the interviews, the strategic plan, annual reports and study guides were used to validate the results.

Another tendency which can be found with questionnaires is the central tendency error. This means that respondents are not willing to give extreme answers. At a five point scale they will give scores between 2 and 4. However, in this study, the education institutes will be asked to motivate their answers. By asking why a specific score was given, the answer of the respondent was validated by the interviewer. Because the respondent had to give reasons for his or her answer, he or she gave extreme answers if there was a sufficient reason for it.

Besides, the questionnaire was presented in English. This implies that there are 0 out of 6

benchmark participants that completed the questionnaire in their native language. The benchmark of schools for higher professional education and university consists of Dutch and German speaking HEIs. This could imply that language could have an influence on the understanding of the questions.

4. From dimensions to questions

This chapter covers the operationalization of the dimensions mentioned in the previous chapter. First is explained which indicators are subject to the dimension and why. Subsequently it is explained what the content of each indicator is. Finally, all indicators are operationalized. At the end of each operationalization of the dimension, the questions from the questionnaire which measure the indicators are presented. The line of reasoning is based on the study by Blok et al. (2013), but if literature gave more or new insights, this was taken into account. The main difference between the work of Blok et al. (2013) and this study is that the dimension 'outreach' includes an additional indicator.

4.1 Strategy

Strategy is the dimension which indirectly contributes to the entrepreneurship education program (Poole and Robertson, 2003). Strategy concerns the question whether entrepreneurship is integrated in the overall strategy of the institution and if so to what extent. Strategy consists of three indicators: goals, policies and embeddedness.

4.1.1 Goals

This indicator concerns the centrality of entrepreneurship in the mission statement and in the strategic plans of the HEI. The importance of entrepreneurship for a HEI and the attention given to entrepreneurship is often reflected by the level of integration of entrepreneurship in the mission statements of the institution (Hoffmann et al, 2004; NIRAS et al., 2008). The leading entrepreneurship education institutes often embed entrepreneurship within their mission statement (NIRAS et al., 2008).

In strategic plans, the strategic goals of the HEI with regard to entrepreneurship education are presented. The embeddedness of entrepreneurship in the strategy of the HEI can stimulate the development and assessment of the entrepreneurship education program. Furthermore, the integration of entrepreneurship in the mission statement and the strategic plans gives an indication of the importance of knowledge transfer for the HEI (NIRAS et al., 2008).

Operationalization

A content analysis of the mission statements of all participating HEIs is executed to measure the indicator goals. These documents were analysed with regard to the topics entrepreneurship in general and entrepreneurship and entrepreneurial skills of students in particular, but also the transfer and commercialization of knowledge and so on. The scores are given on a five-point scale reaching from no embeddedness of the goals in the mission and/or strategy at all, to high-levels of

embeddedness. Because there are major differences in embeddedness of entrepreneurship in the mission between the HEIs, it is possible to discriminate between institutions with the help of these scores.

With regard to the strategic plans, the corporate strategic plan was analysed with regard to the questions whether the HEI wants to create entrepreneurial students and/or entrepreneurial staff, whether the institution itself strives to act and behave entrepreneurially, whether the HEI stimulates entrepreneurship in its environment by helping start-ups or creating start-ups, and whether commercialization or valorisation of knowledge is given priority by the HEI.

4.1.2 Policies

Compared with the indicator goals, the indicator policies is more practical. Where missions and strategies are set at an overall level of the university, policies flow from these goals to the departments and chair groups of the traditional decentralised universities (Sporn, 2001). Often, the success of the implementation of entrepreneurship education programs is determined by factors related to the policy level (NIRAS et al., 2008).

The goals at university level regarding entrepreneurship should not only affect policies of the business or management departments of the HEI, but all departments or chair groups of the HEI should include supportive policies for entrepreneurship in their policy plans (NIRAS et al., 2008; Potter, 2008). The university goals with regard to entrepreneurship can be embedded in (operational) action plans of different departments and chair groups of the HEI (NIRAS et al., 2008). Besides having entrepreneurship policy plans for the different departments, it is also important that the policy plans are clear and guiding for undertaking entrepreneurship education.

Next to having policy plans to develop entrepreneurship within the institution, a HEI can also foster entrepreneurship by attracting employees which have experience in the business world. These employees have experience gained in the field and therefore know what should be offered by the entrepreneurship education program to prepare students for their future career. Next to supportive policies at department or chair group level, existing policies to attract employees with entrepreneurial experience is helpful in developing the entrepreneurship education program of the HEI.

Operationalization

To measure the presence of entrepreneurship policies within different departments, it was asked what percentage of the departments has their own policies/action plans. Also was asked whether the institution as a whole has a clearly written action plan specifically developed for entrepreneurship

education. Besides policy plans for entrepreneurship education and extra-curricular activities, it is also asked whether there are policies to attract/ recruit employees which are active in business.

4.1.3 Embeddedness

In this study, embeddedness means the extent to which policies and strategies for entrepreneurship are embedded in the hierarchy of the HEI. Support from higher positions in the institution affects the embeddedness of entrepreneurship at the lower positions of the HEI (NIRAS et al., 2008). By communicating the vision of the institution, senior managers can motivate employees and let them identify themselves with the overall strategy of the HEI (Sporn, 2001). This identification with the strategy is important, because these employees have to execute the strategy formulated by the management.

Sotirakou (2004) notes the importance of governance in creating a context in which entrepreneurship education can prosper. University governance and leadership do not directly contribute to entrepreneurship but they do create the context for successful entrepreneurship education (Sotirakou, 2004). Not only the input of staff members in the education program is important, but also the choices made by the program director and the support from senior management affect the success of program implementation (Mortimer, 1995).

Important for embedding entrepreneurship is also the support from people in the field (Mortimer, 1995). Various studies show the importance of so called 'champions for entrepreneurship' for embedding entrepreneurship in educational institutes and its education programs (Standish-Kuon and Price, 2002; Gibb & Hannon, 2006; Wilson, 2008). Champions of entrepreneurship can convince the management that entrepreneurship education is important, which in turn is beneficial to the embeddedness of entrepreneurship education through the institution. The HEIs can make use of the knowledge and experience of these practitioners in the development of their education program. Moreover, with the help of practitioners, the HEI can build a highly profiled network of entrepreneurs (Hoffman et al., 2004).

Operationalization

To assess whether entrepreneurship education is supported by the senior management of the HEI, it is asked at which level of the organization the primary strategic responsibility for the entrepreneurship education program is placed. Furthermore, it is asked how many senior managers act as champions of entrepreneurship education and directly or indirectly contribute to the development of the program.

Table 2. Strategy: questions questionnaire

Entrepreneurship goals
1. What is the level of embeddedness of entrepreneurship in the mission statement? 2. What is the level of embeddedness of entrepreneurship in the strategic plan?
Entrepreneurship policies
1. What percentage of the different departments at your institution has their own entrepreneurship policies/action plan? 2. Please indicate the level of agreement with the statement: our university has clearly written institutional policies/action plans for undertaking entrepreneurship education. 3. Please indicate the level of agreement with the statement: Our institution has a policy to attract/recruit employees which are active in business.
Embeddedness of entrepreneurship
1. Where is the placement of the primary strategic responsibility for entrepreneurship education program at your institution? 2. How many high-level managers act as champions of entrepreneurship education and contribute to the development of the educational program?

4.2 Resources

The dimension strategy is essential for a successful entrepreneurship education program. But having sufficient resources is as crucial as strategy, in order to develop and maintain the entrepreneurship education program successfully. In this report the dimension resources, focuses on financial resources and not human or other resources. This is because financial resources are especially important in the start-up phase of the entrepreneurship education program (McMullan & Long, 1987). The research by NIRAS et al. (2008) covers most of the indicators related to resources and is used in this research as well. The dimension resources consist of three indicators: allocation of resources, types of sources and the institution's own generated income are indicators of the framework condition resources.

4.2.1 Allocation

Good budget allocation should ensure that there is a sufficient amount of money available for investments in the entrepreneurship education program. If a HEI wants to develop and maintain an entrepreneurship education program, it is important to have sufficient funding (Wilson, 2008 in Potter, 2008; NIRAS et al., 2008). Entrepreneurship education programs which have a bigger budget can invest in better facilities, offer more activities, train employees, etcetera. Therefore the assumption is that the better the support in terms of funding, the better the performance of the program will be.

However, there should also be (financial) support in a broader sense. Besides the necessary resources for maintaining the program, there should also be budget available for initiating new activities; new courses on entrepreneurship, but also staff or student start-ups or spin-outs are

entrepreneurial activities in need of investment. With dedicated resources available, the entrepreneurial intentions of students, developed through the education program, can be turned into entrepreneurial action.

Operationalization

The indicator allocation is measured by one question and one statement. Participants are asked to give an indication of the level of institutional support for the entrepreneurship education program in terms of funding. This is measured on a five point semantic differential scale ranging from very insufficient to very sufficient. In the questionnaire, a statement is made that aims to measure whether new entrepreneurship education initiatives are stimulated with funding. This statement is measured on a five point semantic differential scale, ranging from totally disagree to totally agree.

4.2.2 Type of sources

The type of sources is important because it gives an indication of the long term certainty of the entrepreneurship education program. Government funding for the development of the entrepreneurship education program is important, for instance, but it often stops before the program can have a significant impact (Wilson, 2008). Diversifying the sources of income is therefore important to developing an entrepreneurship education program that is sustainable over time (Wilson, 2008 in Potter, 2008). Moreover, HEIs which are mainly dependent on state funding are less able to adapt to rapidly changing environments (Sporn, 2001). Diversifying the types of sources therefore decreases the vulnerability of HEIs (Clark, 1998; Williams, 1995).

Besides having diversified sources of income, it is also beneficial to the sustainability of the program to have long term income dedicated for the program (Wilson, 2008; Potter 2008). Resources allocated to the entrepreneurship programs which are long term, from within the institution as well as outside, can therefore contribute to de development of a sustainable entrepreneurship program.

Operationalization

The types of sources are measured by three questions. First, the respondents had to indicate what sources of income are relevant for the entrepreneurship education program. Various options were offered: own activities, institution budget, governmental funds, benefactors and others. Subsequently, respondents had to indicate what percentage of the budget is provided by each individual type of source. Finally, they had to estimate how long the indicated sources of income would remain available for the entrepreneurship education program.

4.2.3 Self-generating activities

The third indicator measures the ability of HEIs to generate income of their own or attract external funding. Self-generating activities like consultancy, admission fees for workshops etc. are often based

on the entrepreneurship expertise of the HEI. It would be valued as positive if certain activities of the entrepreneurship education program were to generate income, which can be allocated to the further development of the entrepreneurship education program (NIRAS et al., 2008). The centres of entrepreneurship play an important role in generating income (Menzies, 1998). According to NIRAS et al. (2008), the more an HEI is able to generate income of its own, the more entrepreneurship becomes a permanent element of the education institute. Furthermore, self-generating activities reduce dependence on external funding.

Operationalization

The ability of HEIs to generate income of their own is measured by the following question: what income generating activities related to entrepreneurship does your institution have? Various options were offered: fees for seminars/workshops, advisory services, donations from people, publication revenues and other ways. The assumption is that the more different kinds of income an HEI is able to generate, the more sustainable the entrepreneurship education program is.

Table 3. Resources: questions questionnaire

Allocation
1. How was the support of the entrepreneurship education program with funding in the previous academic year? **2. Was there enough budget available which stimulated new entrepreneurship education related initiatives, in the previous academic year?**
Type of sources
1. What are the sources of the budget for entrepreneurship? Please indicate the level of agreement with the statement: our university has clearly written institutional policies/action plans for undertaking entrepreneurship education. **2. How long are the previously indicated sources with certainty available for the entrepreneurship budget?**
Self-generated income
1. What activities which generate income does your institution have?

4.3 Institutional infrastructure

The dimensions strategy and resources are important because they both affect the other dimensions. If a HEI has a good strategy and dedicated resources to develop and maintain an entrepreneurship education program, this strategy has to be translated into good institutional infrastructures, education, outreach and development of the program. The dimension institutional infrastructure is covered in this section.

The dimension institutional infrastructure is adapted from studies by Hoffman et al. (2004) and NIRAS et al. (2008). Pittaway and Cope (2007) state that institutional infrastructure is one of the

factors which determine the success of implementing entrepreneurship education. Institutional infrastructure indirectly and directly affects entrepreneurship education (Poole & Robertson, 2003). There are three indicators which measure this framework condition: the availability of physical structures (approaches), the presence of entrepreneurship research and the level of cross-disciplinary structures. Entrepreneurship research is part of this framework condition because it concerns primarily entrepreneurship as an academic research field explored by professionals, instead of activities designed to influence the entrepreneurial mind-set of students. Research in the field of entrepreneurship and executed by students (e.g. PhD, or the degrees Master of Science and Bachelor of Science), which does have a direct influence on their entrepreneurial mind-set, is included in the dimension education.

4.3.1 Approaches

The first indicator involves the kind of facilities which are offered. This indicator is also used in the report for the European Commission (NIRAS et al., 2008). However, their report lacks the question whether there is a meeting place for entrepreneurship students. Having a meeting place leads to the exchange and discussion of ideas and therefore positively influences the performance of the entrepreneurship education program (Hoffmann et al., 2004). The facilities which are covered by the indicator approaches are: entrepreneurship chair group, entrepreneurship centre, incubator facilities, technology transfer offices and a meeting place for entrepreneurship students.

Entrepreneurship is not widely acknowledged as an academic discipline by researchers (Finkle & Deeds, 2001). Having an entrepreneurship academic department/chair group implies that entrepreneurship as a discipline is accepted. Therefore the assumption is that having an entrepreneurship chair group positively affects performance of the entrepreneurship education program.

The presence of a centre of entrepreneurship is important because it affects entrepreneurship education in several ways (Menzies, 1998). Many entrepreneurship centres not only stimulate entrepreneurship within the institution but also work on outreach to nurture entrepreneurship in a broader community. In turn, this positively affects the knowledge transfer of an education institute (Menzies, 1998). Entrepreneurship centres are set up mainly for five reasons: to enhance entrepreneurial knowledge development and research, to foster an entrepreneurial culture for students, to further the interaction between faculty and community, to play a role as liaison for academic, private and government initiatives, to provide a focal point for enhancing the reputation of the faculty or university, and to build and foster outreach (Menzies, 1998).

Incubator facilities, which are one of the physical structures, support entrepreneurship

education programs because they enable start-up firms to rent space on easy terms (Klofsten, 2000). Moreover, incubators enable students to start a company while studying (Rasmussen and Sørheim, 2006). These facilities are important, because entrepreneurship education programs should support the starting up of small firms besides educating students (Klofsten, 2000).

Technology transfer offices also support entrepreneurship education programs, especially the productivity of technology transfer (Siegel and Phan, 2004). University technology transfer involves: licensing agreements, research joint-ventures, university-based start-ups etcetera. Technology transfer offices are important factors (besides capable university scientists, university administrators and entrepreneurs) that can improve the efficiency of the commercial activities of a university. It can lead to increased financial gains. Technology transfer is one of the resources needed by entrepreneurship education (Souitaris et al., 2007), therefore it should be included in high performing entrepreneurship education programs.

The last facility which measures the indicator facilities is the presence of a meeting room for entrepreneurship students. According to Hoffmann et al. (2004), this facility is important for stimulating the discussion and exchange of ideas. The assumption is that meeting rooms will stimulate the entrepreneurial mind-set of students and therefore positively affect the performance of entrepreneurship education programs.

Operationalization

Respondents were asked to indicate whether they have an entrepreneurship chair group or not. The other three questions which could be answered with yes or no are the following: Does your institution provide incubator facilities? Does your institution have a technology transfer office? Does your institution have a physical place where entrepreneurship students can meet (e.g. reading room, café etcetera) to exchange ideas and knowledge?

4.3.2 Cross-disciplinary structures

One of the most important elements in entrepreneurship education is the availability of cross-disciplinary structures of entrepreneurship within the institution (Potter, 2008). Entrepreneurship education should not be limited to the fields of management or business studies, but should be developed by a variety of scientific fields (Sociology, economy, management etc.). As Martinez et al. (2010, p.11) says: “Entrepreneurship education is inherently multidisciplinary in nature”. The advantage of multidisciplinary structures is that the more disciplines are involved in the development and support of the entrepreneurship education program, the more it becomes embedded in different chair groups of the institution. Furthermore, students learn to think beyond their traditional academic discipline and to appreciate potential contributions of other disciplines (Wiese & Sherman,

2011). The process of minimising institutional barriers to realise cross-fertilisation provides creative and innovative learning. Cross-functional learning can result from interdisciplinary teams working on projects in entrepreneurship education (Hynes, 1996; Potter, 2008), and can instil entrepreneurial thinking in all disciplines (Wilson, 2008).

In order to measure cross-disciplinary structures, it is interesting to know how many teachers from different disciplines facilitate courses together. Besides this it is important to know whether the students are multidisciplinary as well (Potter, 2008). Having a mix of students with different backgrounds shows the importance of entrepreneurship in different fields. Besides these two sub-indices – multi-disciplinarity of teachers and students - knowledge has to be gained regarding whether entrepreneurship courses are being developed through the cooperation of different chair groups.

Operationalization

To measure the level of cross-disciplinary structures three questions are asked. Question one is: on average, how many scientific disciplines are represented by the lecturers that facilitate entrepreneurship courses (e.g. sociology, economy, management, etc.)? The second question is: on average, how many different study programs are represented by students in the entrepreneurship courses? The last question concerns the number of courses in which entrepreneurship is part of the content and which were developed through the cooperation of multiple chair groups in the previous year.

4.3.3 Research

Besides having physical facilities to support entrepreneurship education, it is also important to have support from professors and other researchers of the HEI. They can embed entrepreneurship in the HEI through their research (NIRAS et al., 2008). Even though entrepreneurship is not (yet) acknowledged as an academic discipline by researchers (Finkle & Deeds, 2001), it is important to conduct research in order to improve teachers' and students' knowledge on entrepreneurship (Wilson, 2008). According to Wilson (2008), HEIs should employ more professors for entrepreneurship education in order to sustain entrepreneurship at the HEI in general and to invest more time in course development and entrepreneurship research in particular. Research into entrepreneurship still receives little attention. It also enhances entrepreneurship at the faculty and fosters the reputation and outreach of the HEI.

Operationalization

The indicator research is measured by the questions: how many peer-reviewed studies on entrepreneurship were published in the previous academic year? The second question is: how many

entrepreneurship chairs/professorships (in measurement of full time employees) did the institution have in the previous academic year?

Table 4. Institutional infrastructure: questions questionnaire

Approaches
1. Does your institution have an entrepreneurship chair group? **2. Is the Centre of entrepreneurship external or is it embedded in the university** **3. Does your institution provide incubator facilities?** **4. Does your institution have a technology transfer office?** **5. Does your institution have a physical place where entrepreneurship students can meet (e.g. reading room, café etcetera) to exchange ideas and knowledge?**
Cross-disciplinary structures
1. On average, how many scientific disciplines are represented by the lecturers that facilitate entrepreneurship courses (e.g. sociology, economy, management, etc.)? **2. On average, how many different study programs are represented by students in the entrepreneurship courses?** **3. How many courses in which entrepreneurship is part of the content were developed by cooperation of multiple chair groups in the previous year?**
Research
1. How many peer-reviewed studies on entrepreneurship were published in the previous academic year? **2. How many entrepreneurship chairs/professorships (in FTE) did the institution have in the previous academic year?**

4.4 Education

The dimension education concerns all educational activities of the entrepreneurship education program. It is the centre of the entrepreneurship education program because it is affected by the other dimensions and it has a large effect on the performance of the entrepreneurship education program. The dimension education is developed on the basis of the report of the European Commission (NIRAS et al., 2008) and the benchmark research of Hoffman et al. (2004) and Blok et al. (2013).

The larger the number of courses and degrees offered in entrepreneurship education, the more students can be educated to develop an entrepreneurial mind-set. This is called the education scope. But besides the content of the courses and its accessibility to students, the didactic methods are important for students to acquire an entrepreneurial mind-set (Lans & Gulikers, 2010). This is called the education set-up. Traditional teaching methods are not applicable to entrepreneurship education (Potter, 2008). Therefore, an effective entrepreneurship education program provides a diversity of courses and degrees combined with high quality teaching methods. The dimension education is therefore measured by the two indicators: scope and set-up.

4.4.1 Education scope

The indicator education scope covers the supply of courses and the availability of degrees in entrepreneurship. The content of this indicator is obtained from the study by Hoffmann et al. (2004). Contrary to the Hoffman report however, research is not part of the framework condition education, but part of the dimension institutional infrastructure. Only research done by students (e.g. PhD, or the degrees Master of Science and Bachelor of Science) is included in education scope. The presence of a PhD program in entrepreneurship is beneficial because it provides pure entrepreneurship to the faculty or chair group (Kuratko, 2005). It increases research in entrepreneurship and stimulates the development of entrepreneurship education at the HEI. Moreover, it stimulates more quality articles and makes research in entrepreneurship more accepted as an academic discipline.

The number of courses offered by a HEI is also an important indicator of the demand for entrepreneurship education. If there are many courses offered, and if these courses have many ECTS/semester credits and large enrolments, then a lot of students will potentially develop an entrepreneurial mind-set. These three aspects enable calculation of the so-called entrepreneurial student volume: the average number of attendants per course X the number of courses X the average number of credits per course. By comparing this number with the total student enrolment, the relative importance of entrepreneurship education for the HEI can be measured.

Another aspect of entrepreneurship education to consider is the availability of executive education and/or management training. Executive entrepreneurship education stimulates knowledge transfer and is especially important for entrepreneurs who are facing a rapidly changing business climate. Every phase an entrepreneur goes through has different challenges and therefore requires different skills (Hoffmann et al., 2004). Executive education can be a means to develop these skills.

Operationalization

The indicator education scope is measured by five questions. The first question measures the forms of entrepreneurship education offered by the institution: individual courses, B.Sc. minor, full Bachelor degree, M.Sc. minor, M.Sc. major, Full Master degree and PhD. The second question is divided into three parts which together measure the student volume. 1) What was the average number of attendants per entrepreneurship course in the previous academic year? 2) What is the average number of ECTS/ semester credits for entrepreneurship courses? 3) How many entrepreneurship courses were given in the previous academic year? The total number of students at the HEI is obtained from the annual report of the HEI. The third question measures the number of executive education attendants by asking how many people attend the executive education/management training offered, if available.

4.4.2 Education set-up

The set-up of this indicator is inspired by NIRAS et al. (2008) and Hoffmann et al. (2004). It focuses on the content of the courses, the applied type of pedagogy and whether the applied type of pedagogy enhances the development of an entrepreneurial mind-set. According to a systematic literature review done by Pittaway and Cope (2007), most researchers agree that the type of pedagogy is of great importance in entrepreneurship education.

The type of pedagogy in entrepreneurship education varies between learning about entrepreneurship and learning for entrepreneurship (Gibb, 2002; Honig 2004; Menzies, 1998; Kirby, 2004). Most authors agree that 'learning by doing' - which is called experiential learning - is more effective than traditional learning for entrepreneurship (NIRAS et al., 2008; Walter & Dohse, 2009, Dana, 1987). The presence of experimental teaching (Hoffman et al., 2004) promotes innovative behaviour, students' self-assessment and the development of an entrepreneurial spirit (Blenker et al., 2006). Creative and reflexive processes are further encouraged by teaching methods where students are confronted with themselves through reflection methods (NIRAS et al., 2008). To conclude, entrepreneurship education is more successful if it employs an experiential hands-on approach (Aronsson & Birch, 2004; Lepoutre et al., 2010; Solomon et al., 2002).

Another aspect of experiential learning is the participation of students in daily practices of entrepreneurship. Pittaway and Cope (2007) state that entrepreneurship education can have an impact on awareness and perceptions of students when it includes 'real-life' learning and experiential learning. Intensive experiential learning increases self-perceived feasibility, intentions, desirability and propensity to start a venture. It also enhances creativity and positive attitudes towards entrepreneurship (Lepoutre et al., 2010).

Contacts between students and entrepreneurs contribute directly as well as indirectly to the success of entrepreneurship education (Brindley & Ritchie, 2000). An example of a direct relation is when entrepreneurs act as guest lecturers in the education program. Attending guest lectures is one of the ways in which students can be confronted with real-life entrepreneurship problems.

Experiential learning is also enhanced by internships or similar placements (Kirby, 1998; Westhead et al., 2000) and projects with small firms (Hollingsworth et al., 1974; Sonfield, 1981; Chan and Anderson, 1994; Brindley and Ritchie, 2000). It can raise student awareness of entrepreneurship (Ridder & van der Sijde, 2003) and enables experiential learning (Carson, 1985; Chan and Anderson, 1994; Wani et al., 2004). On the other hand, students are useful resources for local firms (Hollingsworth et al., 1974; Sonfield, 1981; Long & Ohtani, 1988).

<u>Operationalization</u>

The first question measures whether the entrepreneurship education at the institution is experimental. This is done by asking the respondents to indicate on a semantic differential line what the approach to teaching methods in entrepreneurship courses is. The semantic differential line ranges from only theoretical/traditional to experimental, which means that the focus is only on learning and reflexive processes. To measure the presence of guest lecturers, respondents are asked what percentage of all lectures in entrepreneurship courses are given by guest speakers. The extent of students' contacts with companies and the degree in which students are familiar with entrepreneurial problems are measured by two more questions: what was the number of ECTS/semester credits for internships or similar practical experiences which are part of the entrepreneurship education program? And how often were entrepreneurship students in contact with a private company in the previous academic year?

Table 5. Education: questions questionnaire

Education Scope
1. Please indicate which form(s) of education regarding entrepreneurship is/are offered by your institution? **2.1 What is the average number of attendants per entrepreneurship course in the previous academic year?** **2.2 What is the average number of ECTS/ semester credits for entrepreneurship courses?** **2.3 How many entrepreneurship courses were given in the previous academic year?** **3. How many people attend the executive education/management training?**
Education set-up
1. Please indicate whether the approach of teaching methods in entrepreneurship courses is theoretical/traditional or experimental (where the focus is on learning and reflexive processes, which involves action-based learning)? **2. To what extent is the personality of students developed by exposing them to real-life entrepreneurship problems. (Development not only of theoretical skills but also personal and practical entrepreneurship skills).** **3. On average, what percentage of all lectures in entrepreneurship courses is given by guest speakers?** **4. What is the number of ECTS/semester credits for internships or similar practical experiences which are part of the entrepreneurship education programs?** **5. On average, how many times were entrepreneurship students in contact with a private company in the previous academic year**

4.5 Outreach

Entrepreneurial universities foster interaction and networking with stakeholders in the community (Formica, 2002). "The involvement of the institutions in the wider environment" is called outreach (NIRAS et al., 2008, p. 45). Outreach activities are important because they offer students the opportunity to gain practical experience with entrepreneurship and, ultimately, to develop an entrepreneurial mind-set. Outreach activities are especially important for university students, because otherwise they might become more isolated from the business world (NIRAS et al., 2008).

The dimension outreach is measured by four indicators: the contacts between a HEI and various external stakeholders is an indicator of the number and variety of opportunities for practical experience offered to students. Community engagement by helping the society and providing knowledge is an indicator of the knowledge transfer of the HEI. Alumni can be seen as important stakeholders beneficial to current students in general and the entrepreneurship education program in particular. In this research, the availability of an established alumni network is a measure for the dimension outreach. The fourth indicator concerns the links a HEI has with industry. This indicator provides more in-depth information on the type of link and for example on perceived barriers and drivers for successful collaborations between the HEIs and industry.

4.5.1 External contacts

An entrepreneurship education program has different linkages with stakeholders, also called external contacts. Hynes and Richardson (2007) state the importance of the stakeholder network in the following way: "The added value of the linkages lies in the ability to provide technical support, business supports and skills development for both the student and the owner/manager" (Hynes & Richardson, 2007; 736). According to Matlay (2011), there are three types of stakeholders which are subsequently called the primary, secondary and tertiary stakeholders. The primary stakeholders are students and staff which are directly involved in entrepreneurship education (Matlay, 2011). Local entrepreneurs and future employers are secondary stakeholders and often influence entrepreneurship in a similar way as alumni do. They are involved in entrepreneurship education activities and try to support the education of future high quality entrepreneurs which are in turn beneficial to the economy (Matlay, 2011). Tertiary stakeholders are representatives of government, industry etcetera. Government agents affect entrepreneurship education through policy and regulations (Matlay, 2011). This means they have influence on entrepreneurship education by education accreditation rules, but also by informing students about policies and regulations regarding entrepreneurship.

External stakeholders are beneficial to students to acquire an entrepreneurial mind-set in various ways (NIRAS et al., 2008; Pittaway & Cope, 2007). Rasmussen and Sørheim (2006) give the following reasons for having links with experienced business people and entrepreneurs: The voluntary support of entrepreneurs increases the quality of the entrepreneurship education program without using financial resources allocated to the education. The knowledge of business people and entrepreneurs keeps the education up to date and relevant. Entrepreneurs can act as role models and have a network which might also be of use to students. Making use of role models can enhance people's ability to recognize, assess and shape opportunities (Fiet, 2001 in Martinez et al., 2010). So

all in all, providing network events can create contacts for students and is assumed to be a necessary resource for proper entrepreneurship education (Souitaris et al., 2007).

Operationalization

The links with external stakeholders is measured by the question: What links does your institution have with external stakeholders of your entrepreneurship education program and do they contribute to the entrepreneurship education program? The respondents could either simply indicate the contacts, or also whether they contribute to the program. Contribution was split into financial or other means of contributing to the program. The HEIs received points for every contact they have with each stakeholder and they received two points if these stakeholders also contribute to the program. Subsequently the total number of points was calculated. These total numbers of points were translated into a five point parametric scale with 1= the lowest total points and 5= the highest total points. The respondents were required to indicate whether the HEIs students never (score =1), now and then (score= 2), regularly (score= 3), often (score= 4) or continuously (score= 5) participated in entrepreneurship events outside the institution.

4.5.2 Community engagement

Community engagement and knowledge transfer to society is vital because it aligns the entrepreneurship education program with the dynamics of the environment around the institution. Therefore connecting the entrepreneurship education with the community can be beneficial. This connection points in two directions: facilities are provided to the environment and students are provided with contacts enabling them to enter that environment (NIRAS et al., 2008).

Rasmussen and Sørheim (2006) have pointed out that the offering of mentoring and/or vocational guidance is a necessity for students starting a new business while studying. This not only applies to new ventures but also to firms in later stages of development. Mentor schemes, i.e. entrepreneurship professionals helping entrepreneurship students with their (future) start-ups, stimulate entrepreneurship and new ventures by students (Hoffmann et al., 2004; Rasmussen and Sørheim, 2006) and therefore included in this research.

Etzkowitz (2003) indicates the importance of community engagement to the commercialization of research and technology by education institutes. University and industry based innovation should influence, stimulate and fertilize each other (Etzkowitz, 2003). The commercialization of research is covered in this study by the share of third flow of funding (e.g. through contract research) and the number of patents. Patents give for-profit firms a signal that the institution is serious in furthering commercialization and recognizes the needs of firms because the institution invested time, effort and resources in obtaining the patent. Therefore firms can become

more interested in obtaining the technology created by the university (Bell & McNamara, 1991 in Powers & McDougall, 2004). Research by Shane (2001) shows that universities with greater domestic and international patent class coverage and patent citations were highly predictive for the development of technology via formation of start-ups.

However, it is not only the institution which is an essential actor in community engagement. The role of students in the network is important as well because interaction between students and the community can lead to the transfer of knowledge and ultimately contribute to society (NIRAS et al., 2008).

Operationalization

To measure the indicator community engagement HEIs were asked to give an estimation of the number of people other than students making use of vocational guidance and/or mentor schemes affiliated to the entrepreneurial activities. This question is an open question and thus not measured on a five point scale. The commercialization of research is measured by the share of the third flow of funding (e.g. contract research) in the total budget of the HEI. The respondents were also asked to give an estimate of the average number of patents. The first question is validated by calculating the third flow of funding with data from the annual financial plan of the institute. The patents are validated by accessing data of patents from the database of the World Intellectual Property Organization. This is a specialized agency of the United Nations which promotes the protection of intellectual property. Subsequently the institution's contribution to the wider community is evaluated. The wider community involves entrepreneurs, local schools, people outside of the education institute, and companies. The wider community can be national or international. These aspects are measured by five questions. Respondents had to answer with either yes or no whether the institution: 1. has an advice centre for entrepreneurs. 2. Supports entrepreneurial activities in schools. 3. Hosts entrepreneurial events open to people other than students or academic staff. 4. Provides training (e.g. boot camp) for entrepreneurs and companies. 5. Supports entrepreneurship not only on a local scale but also on an international scale.

4.5.3 Alumni

Alumni are important for an entrepreneurship education program because they have practical experience of the field (NIRAS et al., 2008; Hoffman et al. 2004). Alumni are often part of the business world and can therefore provide good links between the entrepreneurship program and the wider community. Furthermore, alumni can be useful in more ways than other stakeholders. Monitoring alumni can help to evaluate the impact of the education program and, on the basis of these evaluations, to improve the program. Alumni can also play an important role in the

development of entrepreneurial activities of the institution (NIRAS et al., 2008; Standish-Kuon & Price, 2002), for instance as guest lecturers, as assessors in business plans competitions and by providing placements for students (Matlay, 2011). Because the presence of an alumni network is beneficial to the program (Standish-Kuon & Price, 2002), it is the third indicator of the framework condition outreach.

Operationalization

The education institute had to indicate whether they keep track of the alumni and if so, why? The following options were given: keeping contact, keeping track of growth and number of ventures started by graduates, doing research with alumni as respondents, and other reasons. The second question is: how many alumni are involved in the entrepreneurship education program? The reasons why the HEI keeps track of alumni are five in total. Therefore the scores can range from 0 to 5. The question how many alumni are involved in the program is an open question. The answers were translated into a five point parametric scale where 1= the lowest number of alumni involved in the program and 5= the highest number of alumni involved in the program.

4.5.4 University-industry collaboration

As mentioned in section 4.5.1, a higher education institute can have various contacts with different stakeholders. The industry (private companies, entrepreneurs) can be seen as one of those stakeholders. This specific group of stakeholders can offer the higher education institutes the possibility to collaborate with them in specific areas. Collaboration with industry is beneficial for students to acquire an entrepreneurial mind-set in various ways (NIRAS et al., 2008; Pittaway & Cope, 2007). Rasmussen and Sørheim (2006) give the following reasons for having links with experienced business people and entrepreneurs: The voluntary support of entrepreneurs increases the quality of the entrepreneurship education program without using financial resources allocated to the education. The knowledge of business people and entrepreneurs keeps the education up to date and relevant. Entrepreneurs can act as role models and have a network which might also be of use to students. Making use of role models can enhance people's ability to recognize, assess and shape opportunities (Fiet, 2001 in Martinez et al., 2010). Section 4.5.1 offers some insights in the different groups of stakeholders involved in the education program of the HEI and their possible contribution to the program. To address the topic of collaboration properly, more information is needed in order to grasp the influence of collaboration on the performance of the higher education institutes.

Within this indicator the aspects of the literature review presented in section 2.3 are taken into account. The pre-linkage phase covers questions about the motivation and need to collaborate and where to meet new collaboration partners. The motivation and need are important to measure,

because they are essential in making the collaboration a success (Perkmann & Walsh, 2007). Research funding (Plewa et al., 2013), the opportunity for students to learn from "real" business situations (Rasmussen and Sørheim, 2006) and the creation valuable IP to foster technology transfer (Yusuf, 2008) are possible motivations for HEIs to collaborate with the industry. New partners need to be searched for by the HEIs and they can do that in several ways. Possible meeting places are conferences, workshops and symposiums, referrals from colleagues and/or internet searching (Easton, 2010)).

The next aspect which is measured is the establishment of the collaboration. In the questionnaire the following question is already taken into account: "Does your institution has links with the following external stakeholders of your entrepreneurship education program and do they contribute to the entrepreneurship education program? (With government, foundations, entrepreneurs, science parks, private companies, investors and other as categories). This question does not provide information on what type of links the institution has with industry and therefore another question will be added to the questionnaire which covers more in depth information about the type of linkage with the business environment. This is relevant information because different types of collaboration exist and each type of collaboration implies a different level of collaboration (from less intensive contacts to more intensive contacts). Joint research, recruitment of graduates or postgraduates, student placements, interactions in meetings and at conferences, consultancy and contract research, spin-off creation, creation of physical facilities, training, and licensing of intellectual property are types of collaboration which are derived from the literature (Bruneel et al., 2010; D'Este and Patel, 2007; Plewa et al., 2013)). This question gives more insights in what type of linkages the university has with industry. Some of the options have a possible effect on students (regarding their experience with entrepreneurship), others more on researchers or at the level of the institution. Therefore it could be the case that some of them could have more influence on the performance of the entrepreneurship education program. The more types of links the HEI has with industry, the more effect this could possibly have on the performance.

Bodas Freitas et al. (2013) mention in their research that the danger exists that research only focuses on formal and institutional collaborations, even though it has been found in practice that informal and personal contacts are also valuable. Therefore this research incorporated both modes of governance. Having formal or institutionalized agreements/contracts, does not mean that the collaboration between university and industry is better organized. By not asking about informal and/or personal agreements a lot of information could be overlooked and ignored (Bodas Freitas et al., 2013, D'Este and Patel, 2007).

Drivers and barriers for successful collaboration are an important aspect of university-

industry collaboration (Bruneel et al., 2010; Plewa et al., 2010). In order for HEIs to learn from each other, drivers and barriers need to be distinguished. Retrieving success stories enables giving advice to the HEIs which have more trouble with collaborating with industry. According to Plewa et al. (2013), Bruneel et al. (2010) and Boehm et al. (2013) trust, communication, understanding, interpersonal skills, experience with collaboration and breadth of interaction channels can be seen as possible drivers for collaboration. Possible barriers were also identified during the literature review. Communication difficulties, differences in objectives, differences in the perception of goal achievement, uncertainty, the long-term orientation of the university, administrative procedures, and differences in institutional norms (public versus private knowledge) are indicated as possible barriers (Dasgupta and David, 1994; Bruneel et al., 2010; Brown and Daguid, 2000; Elmuti et al., 2005; Hall et al., 2003; Santoro and Betts, 2002). Bruneel et al. (2010) distinguish in their research between transaction related barriers and orientation related barriers. In order to give proper advice to the HEIs it is necessary to know what the HEIs perceive as harder to overcome.

The evaluation of collaboration is important for possible future collaborations (Elmuti et al., 2005). It is important for the relationship between the HEI and the industry partner to come back to the goals set beforehand, in order to assess the successfulness of the collaboration. But also other outcomes can be identified as 'successful'.

Operationalization

To measure the motivation and need the following questions are constructed: 'What is the motivation of the institution to collaborate with industry (private companies, entrepreneurs)?' and 'What are the needs of the institution to which collaboration can contribute?'. The HEIs were also asked to indicate where they meet new potential collaboration partners. Furthermore, the HEIs were asked for the type of links they have with industry; "When looking at the linkages between your institution and the business environment (entrepreneurs, private companies), what type of links does your institution have?". In order to surface the different modes of governance used at the higher education institutes, the HEIs are asked to indicate (per type of collaboration) whether this is constituted at a formal/informal level and whether it is institutionally or personally arranged. To surface success stories, but also failures, two open ended questions are asked: 'Take an example of a *best practice (bad practice)* in mind. What made this collaboration a success (failure)?'. The higher education institutes are also confronted with some drivers and barriers which they need to identify as applicable to their own situation. Finally the HEIs were asked to elaborate on the way they evaluate the collaboration with industry.

Table 6. Outreach: questions questionnaire

Links with external stakeholders
1. Does your institution has links with the following external stakeholders of your entrepreneurship education program and do they contribute to the entrepreneurship education program? 2. How many entrepreneurship students at our institution participate in Entrepreneurship events/projects or business plan competitions outside your institution?
Community engagement
1. Please give an estimation of the number of people other than students making use of vocational guidance and/or mentor schemes affiliated to the entrepreneurial activities? 2. What is the percentage share of the third flow of funding (e.g. contract research) of the total budget of the university? 3. Please give an estimation of the average number of patents 4. Please indicate whether: 4.1 The institution has an advice centre for entrepreneurs 4.2 The institution supports entrepreneurial activities in schools 4.3 The institution hosts entrepreneurial events open to people other than students or academic staff 4.4 The institution provides training (e.g. boot camp) for entrepreneurs and companies 4.5 The institution supports entrepreneurship not only on a local scale but also on an international scale
Alumni
1. The university keeps track of alumni for what reasons? 2. How many alumni are involved in the entrepreneurship education program?
University-industry collaboration
1.1 What is the motivation of the HEI to collaborate with industry? 1.2 What is the need of the HEI to collaborate with industry? 1.3 Where does your HEI meet new partners for collaboration? 2.1 Does your institution has links with the following external stakeholders of your entrepreneurship education program and do they contribute to the entrepreneurship education program? 2.2 Are these links formal/informal and institutional/personal? 3.1 Take an example of a good and bad practice in mind. What made this collaboration (not) successful?' 3.2 Which drivers and barriers do you recognize when looking at less successful collaborations with industry? 4. How does your HEI evaluates HEI-industry collaborations?

4.6 Development

The proverbial truth that stagnation means decline also holds for entrepreneurship education programs (Pittaway & Cope, 2007). Entrepreneurship education should adapt to the ever changing needs and wants of the users of the education program and the stakeholders involved in the program. By continuously trying to improve the program, it can satisfy the actors which are involved (NIRAS et al., 2008).

This dimension refers to the effort to effectuate continuous improvement of entrepreneurship at the HEI. The dimension development is measured by three indicators which are subsequently: user-driven improvement, evaluation of goals, and investment in human resources. These indicators were obtained from NIRAS et al. (2008), Hoffmann et al. (2004) and Blok et al. (2013).

4.6.1 User-driven improvement

The indicator user-driven improvement measures to what extent HEIs take the wishes of students, alumni and other stakeholders regarding the entrepreneurship education program into account. Students are the main focus of the entrepreneurship education program and are therefore seen as the primary stakeholders of the program (Matlay, 2011). Users are able to evaluate the performance of the program and this information can be helpful to improve the education program. Whitely (1995) also indicates the importance of self-evaluation to improve the education program in the long run. This involves the teachers' evaluation of their own courses and the pedagogic methods applied and how they can improve it.

Operationalization

This indicator is measured by asking respondents what indicators are used to evaluate the entrepreneurship courses. The respondents were able to choose from the following methods: self-evaluation by the lecturer, peer reviews, evaluation by students, executive staff and/or other.

4.6.2 Evaluation of goals

There are also other stakeholders involved in the evaluation and development of the education program. The board wants to evaluate whether the goals of the entrepreneurship education program are reached, and also the satisfaction of employees and other stakeholders with regard to the education program is important for evaluation and development. The evaluations by these different stakeholders can influence the improvement of the program directly or indirectly (Rossi et al., 2004).

Operationalization

The respondents had to indicate how often (formal and informal) the education institute evaluated the following aspects of the entrepreneurship education program: the effect of entrepreneurship education on students' careers, and examination whether stakeholders' needs are met.

4.6.3 Investment in human resources

One crucial area of development is the development of the human resources involved in entrepreneurship education. There are several reasons why it is important to invest in the teachers of the entrepreneurship education program.

Because of the growth of entrepreneurship education programs all over Europe, investments are necessary to increase the number of professors in entrepreneurship (Wilson, 2008). Entrepreneurship education is different from regular education and therefore requires lecturers and guest speakers who have the skills to be entrepreneurship teachers. Investment in human resources is needed, because the Introduction of experiential approaches in training for teachers can take as

much effort as developing a curriculum. Sorgman and Parkison (2008) state that teachers starting out in entrepreneurship education are often unprepared for the shift towards the more experiential learning which is needed.

Investments in human resources are also needed to create ambitious and enthusiastic entrepreneurial lecturers and other employees of entrepreneurship education. Having sufficient resources to encourage lecturers is important for improving or sustaining these previously mentioned characteristics of employees. The lecturers should be trained and encouraged to attend training (Wilson, 2008). This indicator is called the human resources development and management.

Operationalization

In the first question, respondents are asked to indicate through what means the HEI encourages lecturers to take initiative related to entrepreneurship education. The following options were offered: less teaching, higher salary, grants/fellowships, awards, and/or other.

To measure how the institute expressed recognition for achievements of academic staff, the following question was asked: does our institution provide recognition for the achievements of academic staff members which are active in entrepreneurship education? The following answers were allowed: awards, professorial status, monetary awards, fellowships, other or none. More options were possible. Besides asking what is offered and possible, it is also interesting to know what effect this has. Therefore, the question is asked what percentage of teachers of entrepreneurship courses engage in education training/coaching aimed at improving their entrepreneurship education skills? This is an open question which resulted in a ratio variable.

Table 7. Development: questions questionnaire

User-driven improvement
1. Please indicate the methods used by your institution to evaluate the entrepreneurship courses
Evaluation of goals
1. How frequently is the effect of the entrepreneurship education on the student's career being monitored? **2. How frequently does examination of the needs of stakeholders (employers, business angels, technology brokers and others) take place?** **3. How frequently does the institution make use of a procedure for following up on its entrepreneurship goals and strategies?**
Human resource development and management
1. The institution encourages lecturers by means of which incentives to take entrepreneurship education related initiatives? **2. How does your institution provide recognition for the achievements of academic staff members which are active in entrepreneurship education?** **3. What percentage of teachers of entrepreneurship courses engage in education training/coaching aimed at improving their entrepreneurship education skills?**

5. Results

This chapter provides insights in the results from the performed benchmark study. The results of the participating HEIs related to the three performance indicators are presented and these results are followed up by the scores on the six dimensions of entrepreneurship education. The purpose of this study has already been mentioned in the introduction of the report. However, due to the specific character of this benchmark study some things need to be kept in mind when reading the results. To prevent misinterpretation of the results it has to be clear that the purpose of this study is not to determine the best entrepreneurship education program, which is also not possible due to the heterogeneous sample. Instead, the purpose is *to learn from the good practice education institutes that can serve as role models and provide inspiration for improvement*. Therefore determining these good practices is a necessity to achieve improvement. The assumption is that the HEIs will be inspired by the initiatives carried out by the good practices in this benchmark study.

5.1 Performance

The 'good practices' are determined on the basis of the three performance indicators (entrepreneurial students through education, knowledge transfer and entrepreneurial students through practice). The relationships between the six dimensions and the performance are included in the analysis. These dimensions can be used as explanations or causes of the performance of the higher education institutes and are presented after the analysis of the performance.

5.1.1 Entrepreneurial students through education

This indicator is measured by the student volume of entrepreneurship education. The student volume is a measure of the total volume of entrepreneurship education followed by students. Therefore multiplying the average number of students per course by the number of courses, gives an indication of the demand for entrepreneurship education. However, it is likely that larger universities have more entrepreneurship students in absolute numbers. Therefore dividing the number of students by the size of the university makes the numbers more comparable. Besides calculating the number of students it is important to know the size of the courses in ECTS. This varied considerably among the higher education institutes. Therefore multiplying the relative share of students attending entrepreneurship courses by the size (in ECTS) of the courses gives a good insight in the total volume of attended entrepreneurship education. The results of these calculations can be found in Table 8 .

Table 8. Student volume

	(1) Absolute number of students	(2) Size of education institute	(3) Relative share of students = (1)/(2)	(4) Average ECTS per course	Student volume = (3)*(4)
ERW6	990	21300	0.0465	6	0.2789
ERW5	160	2614	0.0612	4	0.2448
ERW3	300	7100	0.0423	3	0.1268
ERW2	150	7298	0.0206	6	0.1233
ERW1	450	30000	0.0150	7.5	0.1125
ERW4	360	39000	0.0092	8	0.0738

Table 8 shows that looking at the absolute number of students, the ERW6 has by far the largest share of students who follow entrepreneurship courses. Even after correcting this number for the size of the HEI, it still is the good practice example. The ERW5 with 160 students (absolute), but much smaller size of the whole organisation (smallest HEI in the sample), performs also relatively good after correcting for the size of the HEI. Within the sample of these HEI's, the number of ECTS per course varies from 8 (highest) to 3 (lowest). This has an influence on the student volume, which can also be seen in Table 8. The ERW6 remains the good practice example with a relatively higher number of students and an average number of 6 ECTS per course. ERW5, ERW3, ERW2 and ERW1 all cluster around the same student volume. The ERW4 shows most room for improvement in relation to the other HEI's. With a relatively low share of students following entrepreneurship courses, which is due to the typical character of the main entrepreneurship course (see paragraph Education), the ERW4 score lowest on student volume.

The score on student volume of the higher education institutes is translated into a score on a five point scale. ERW6 provides entrepreneurship education to the largest share of students of all higher education institutes. The reason for this is that almost all students are reached because entrepreneurship courses are implemented in the curriculum for almost all study programs. For example the Master study program Biology (as well as for all Science and Medical science study programs) has a cluster of four variants from which a student can choose and one of them is called 'managing innovation' in which entrepreneurship plays a central role. The large number of courses which have many ECTS, results in the largest share of entrepreneurial students through education. Figure 6 represents the scores obtained from translating the student volume into a discrete five point scale, with 5 being the highest scoring HEI and 1 the lowest scoring HEI on entrepreneurial students through education.

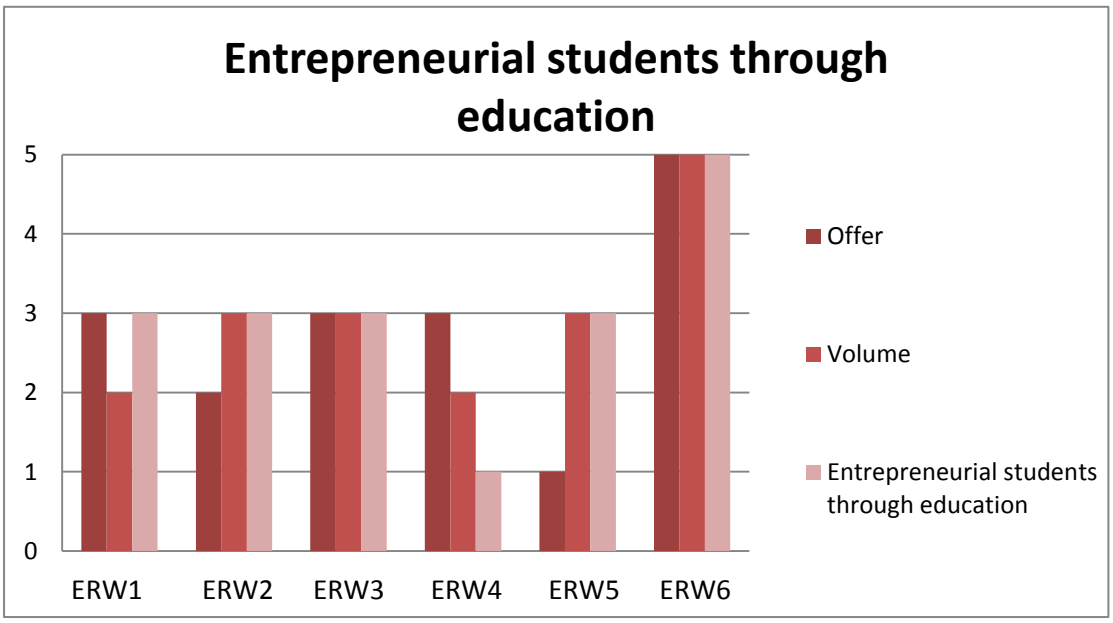


Figure 6. Entrepreneurial students through education

5.1.2 Knowledge transfer

The indicator knowledge transfer is measured by the number of peer reviewed studies, patents and the percentage of third flow of funding. A remark needs to be made when analysing this particular indicator and its effect on the overall performance. Universities and universities of applied sciences do considerably differ from each other considering their aim to create knowledge. Where universities are driven to create and transfer knowledge, a more practice driven approach of research and development is the main driver at universities of applied sciences. As expected, the universities scored higher than the universities of applied sciences. The results shown below should therefore be read and interpreted with caution.

The number of peer reviewed studies varied from 0 to 10. Here the difference between universities and universities of applied science really becomes visible. Where the ERW6 published 10 studies, the ERW1 published 2 and the ERW5 0. Researchers at universities are driven to publish their studies and have often a quota of number of articles which need to be published. The focus of the universities of applied sciences is more on educating instead of research and the employees do not necessarily have to meet requirements concerning publications, even though a professorship in applied sciences (lectoraat) becomes more visible in the structure of some Dutch HEIs (ERW1). Therefore there is a big difference in scores on peer reviewed studies.

Even though not all patents are part of the WIPO database, it does give some insight to which extent the numbers of published patents of the HEIs differ from each other. Especially because respondents could not answer the question about patents in the questionnaire properly (due to lack of sufficient information), the WIPO database gives a solid backup and validation of the given answers.

Translating these absolute numbers into a discrete five point scale, ERW3 receives the highest score with 55 patents applied for in the last three years. The ERW5 scores lowest with zero applied patents. As mentioned before the ERW5 is a special case, since the university of applied science only exists for four years now. This limited timespan makes it impossible for the HEI to have already applied for a patent. The other university of applied sciences also scores low, with 0 patents registered in the WIPO database and 2 patents mentioned during the interview.

The third aspect of knowledge transfer is the percentage of third flow of funding. The percentage of third flow of funding is calculated from the annual financial plans of the higher education institutes. The range varies from 15.7% (the lowest scoring HEI) to the highest scoring HEI with 32.8%. The ranking based on percentage of third flow of funding shows that the ERW2 and the ERW6 score the highest with 32.8% and 30.2% of the income obtained from third parties.

These three aspects lead to the combined result of the indicator knowledge transfer. As Figure 7 shows, the ERW2 has the highest score on knowledge transfer (4.33), followed by ERW6 with a score of 4. Figure 7 illustrates the difficulties of comparing universities and universities of applied sciences when it comes to the indicator knowledge transfer. The nature of the two types of HEI's differ from each other on some crucial aspects, especially concerning knowledge transfer. The lowest scoring HEI's are therefore no surprise, ERW1 and ERW5 receive with 1.33 and 1 the lowest scores on the indicator knowledge transfer.

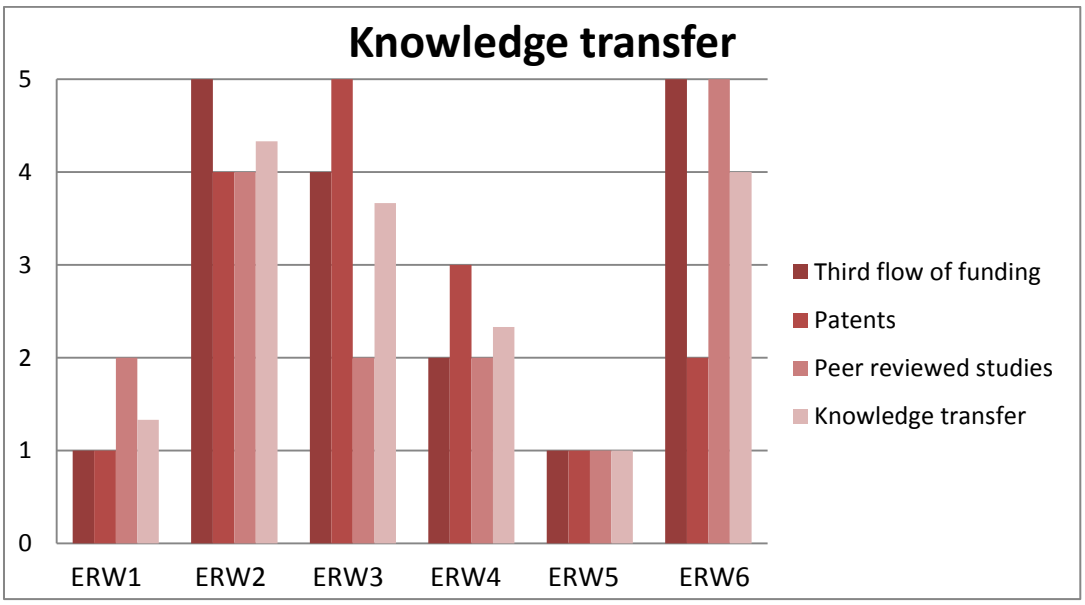


Figure 7. Knowledge transfer

5.1.3 Entrepreneurial students through practice

The third and last indicator that measures the performance of the higher education institutes involves students developing an entrepreneurial mind-set through practical experience.

At the ERW3 there are continuously students participating in entrepreneurship events outside of the education institute, such as business plan competitions, and therefore score well on this indicator. This might be the result of close connections with organizations such as young enterprises. In their strategic plan they also state that close collaboration with entrepreneurial organisations is a focus point. Some other higher education institutes indicate that there are students participating in entrepreneurship events outside of their education institute on a regular basis, except ERW4 and ERW5 which indicate that there are now and then students undertaking these events.

The number of executive training attendants is the highest for the ERW2 with 150 attendants. It is followed by the ERW1 which is home to twenty executive education attendants and ERW6 which is home to thirteen attendants. The other higher education institutes do not offer executive training.

These results lead to the following ranking of the HEI's concerning the entrepreneurial students through practice (Figure 8). Due to the relatively high number of attendants for the executive training, the ERW2 scores high on the indicator entrepreneurial students through practice. The ERW2 is followed by the ERW1, ERW3 and ERW6. The two German HEI's score the lowest on entrepreneurial students through practice.

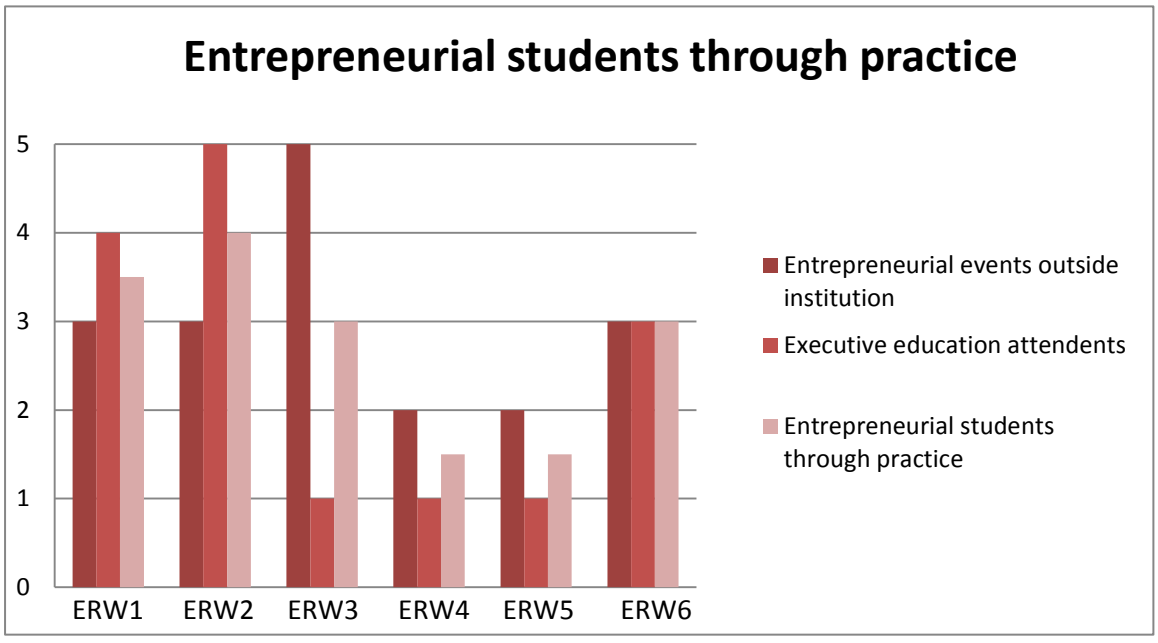


Figure 8. Entrepreneurial students through practice

5.1.4 Overall results performance

The figure below shows the performance of the higher education institutes. This score is the average taken from the three indicators of the performance. The scores on the three indicators are translated

into scores on five point scales except the questions which were already measured on a five point scale.

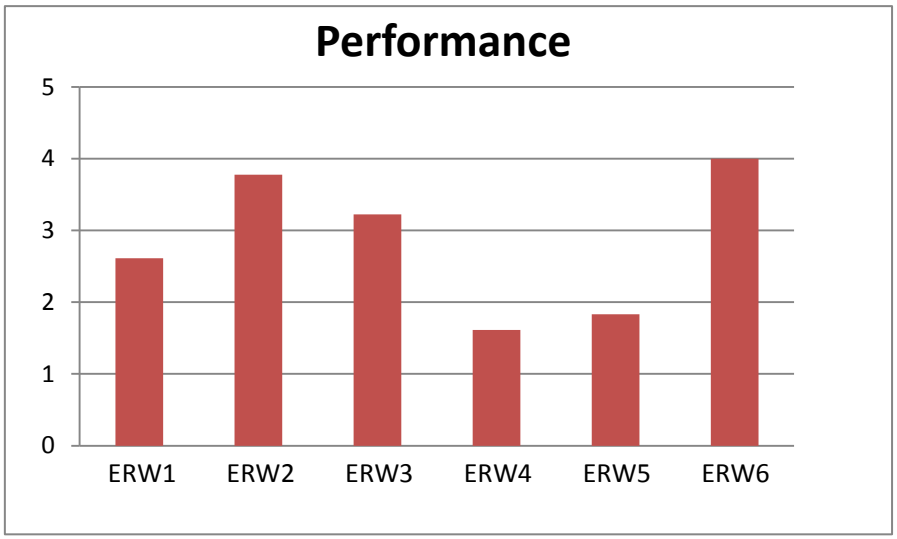


Figure 9. Overall performance

The ERW6 is the best performing higher education institute, followed by the ERW2 and ERW3. The ERW6 scores high on the performance, because of their relatively high number of students taught in entrepreneurship; they make sure that all students have to opportunity to take entrepreneurship related courses. The two universities of applied sciences (ERW1 and ERW5) score lower than the three universities, which is due to the heavy weight of knowledge transfer in the total performance.

The next paragraphs show the results for the dimensions of entrepreneurship education in which the universities of applied sciences will have less skewed results. The ERW4 is the HEI with most potential to develop itself on the domain of entrepreneurship education, followed by the ERW5. The ERW6 and the ERW2 are used throughout the next paragraphs as good practice examples, which is referred to by using examples of activities performed by these two HEIs.

5.2 Strategy

This section covers the results of the HEI's on the indicators which measure the dimension strategy. The indicators which are discussed are 'goals', 'policies' and 'embeddedness'. Besides making use of graphs and tables, this report also includes explanations for results given by the HEI's. The explanations are presented by making use of quotes. At the end of this paragraph an average score of the three indicators is given, which results in an overall performance on the dimension strategy.

5.2.1 Goals

This indicator is measured by conducting a content analysis of mission statements and a content analysis of strategic plans. Other documents were not used for the content analysis.

Mission statement

The content analysis executed on the mission statements shows that there are major differences in the presence of entrepreneurship in mission statements between the higher education institutes. The ERW5 does not have a mission statement at all, which is mainly due to their short period of existence as university of applied science and their overall lack of written policy and strategy. There are three HEI's which only mention entrepreneurship to some extent in their mission statement. For example, the ERW6 focuses on breakthrough sciences and stimulating cooperation between specialised research institutes and a strong focus on the links with education and knowledge transfer. An example of a HEI that did integrate entrepreneurship in the mission statement is the ERW1. This can be traced back to the following quote from the mission statement of the ERW1:

*"The ** aims to contribute to the realisation of creating knowledge, believes in the claim that knowledge is the engine of economic development and combines its excellent track record in the terms of stimulating entrepreneurship and organizing valorisation programs to its policy".* (Mission statement ERW1; in instellingsplan kennis in interactie 2012-2016)

In short, the ERW1 states that they want to deliver future entrepreneurs with their education. Furthermore, they state that knowledge transfer and education cannot be sustained without each other. They want to become the best centre of education and expertise by being market oriented and entrepreneurial, which is different from the other HEI's.

Also the ERW3 has mentioned entrepreneurship in their mission statement:

*"In the field of knowledge valorisation ** is committed to ensuring that its research results are translated into successful innovations and new companies. ** encourages students and staff to be entrepreneurial." (*Mission statement ERW3; in where innovation starts, 2020)

Strategic plan

The presence of entrepreneurship in strategic plans did vary less between the HEI's than their scores on the mission statement. At all higher education institutes several aspects of entrepreneurship are identified in the strategic plans. The strategic plans showed that there can be a focus on:

- Entrepreneurship or entrepreneurial behaviour of staff (ERW3, ERW1)
- Entrepreneurship or entrepreneurial behaviour of students (ERW3, ERW1, ERW2, ERW4, ERW6)

- The university as an entrepreneurial entity itself (ERW3, ERW1)
- Knowledge valorisation and commercialization (ERW1, ERW6, ERW3, ERW2)
- Development of entrepreneurship in the environment/network around the university (ERW2, ERW3, ERW1)

The ERW3 and the ERW1 have the highest scores on the presence of entrepreneurship in their strategic plans. An example of the centrality of entrepreneurship in strategic plans is presented in the following quotation:

*"The active promotion of entrepreneurship among students and staff will remain a key objective in the coming years. A minor in the Bachelor programs and a special graduation program in the Master programs enable ** students the possibility to prepare specifically for starting up a business. This is supplemented by information and PhD activities, programs and workshops about entrepreneurship. ** also undertakes research into entrepreneurship in the technology sector via collaboration with the University of Tilburg in the joint Brabant Centre of Entrepreneurship. This centre will secure ties in the coming years with MBO and HBO institutes in the province. At that level, too, entrepreneurship will be promoted."* (Strategic plan ERW3; in where innovation starts, 2020)

The ERW3 combines education and research related projects with entrepreneurship and actively seeks for collaborations between other education institutes with an entrepreneurial vision. The ERW1 also explicitly mentions entrepreneurship in their strategic plan:

"Stimulating entrepreneurship has been an aspect for a long time now, to which we give a lot of attention and in which we have established a good reputation in the region. It is therefore one of our eight main focus points ('speerpunt' in Dutch)" [...] "Besides the Centre for Entrepreneurship we have a project called Student Companies. Within various educational programs it is a mandatory part and is based on the principle of stimulating, challenging and encouraging an entrepreneurial mind set and as a minimum outcome entrepreneurial behaviour is demanded. it is a form of action-oriented (challenging) entrepreneurship education based by the principle of 'learning by doing'." (Strategic plan ERW1; in instellingsplan kennis in interactie 2012-2016)

5.2.2 Policies

There are three aspects which are used to measure policies regarding entrepreneurship within the higher education institute. These three aspects are: the number of departments with their own entrepreneurship policy plans, the question whether the university has clear policy/action plans regarding entrepreneurship and whether the institute tries to attract potential employees active in business. The following diagram (Figure 10) presents the scores of every HEI separately. The higher

education institutes are ranked from the highest score on the indicator policy to the lowest score on the indicator policy.

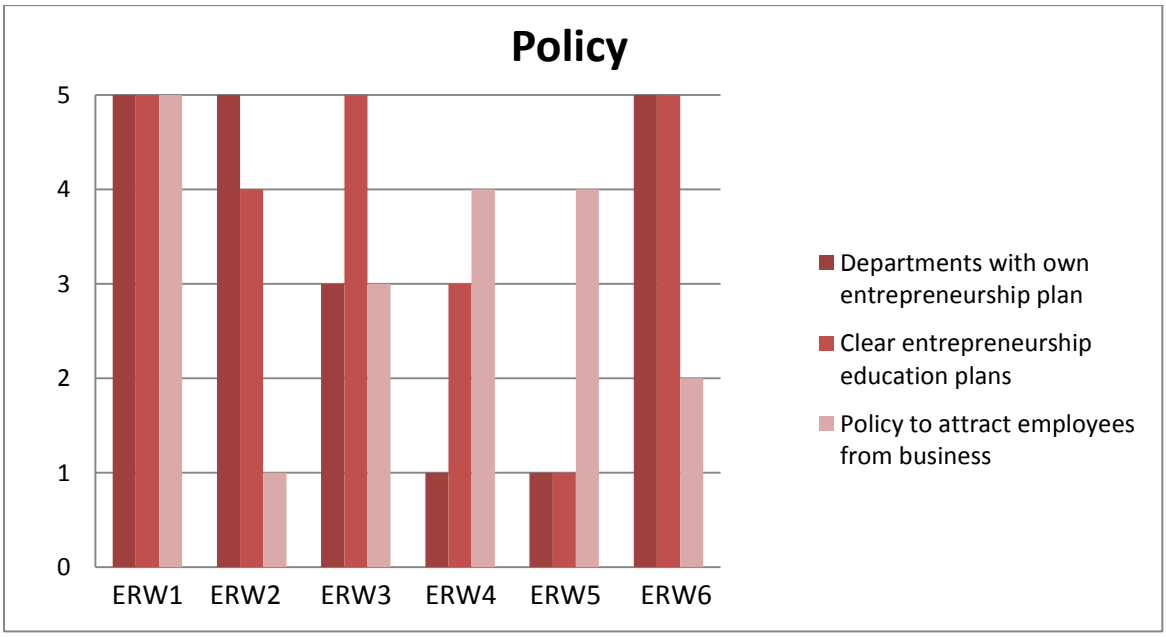


Figure 10. Policy

Departments have their own entrepreneurship plan

At the ERW1, the ERW2 and the ERW6, the departments have their own entrepreneurship plans as a result of the decision by the board to decentralize the entrepreneurship policies. This implies that every department has its own plan of approach regarding entrepreneurship activities. The entrepreneurship plans for entrepreneurship activities (not education) are the responsibility of the director of all individual science departments. At the ERW5 every department individually does not have an official paper with action plans. This implies that there are no clear departmental entrepreneurship plans for individual departments. However, at an overall level and unofficially, the boards of the departments/faculties have a policy to implement entrepreneurship in the departments.

Clearly written entrepreneurship education plans

The ERW1 has an overarching entrepreneurship education plan to stimulate entrepreneurship among students from all disciplines. However, in some fields entrepreneurship does not come naturally to students (e.g. in technology and health care sciences). For these departments, information and coaching are provided to enhance entrepreneurship for the benefit of the students at the ERW1. Other studies (e.g. business management) really have entrepreneurship at the centre of their actions. Also the ERW6 offers Master students from almost all disciplines (especially within beta

studies) a module in which they can choose, among four options for an innovation/entrepreneurship track.

Policy to attract employees from business

Even though the ERW6 and the ERW4 both are universities, they mention in the interviews to have a policy to attract employees with not only academic skills, but with preferably business experience as well. But for the ERW6, this cannot be traced back in for example the strategic plan, where the main focus is on attracting employees with an academic background. There seems to be a discrepancy between the written documents and the thoughts of the interviewees. What was mentioned during the interview is that the special professorship (in Dutch: bijzonder hoogeleraarschap) is popular among people from the business environment.

"This specific type of professorship allows the ERW6 to bring people from the business environment into our education. Companies are very eager to have a position like this and there are very strong preconditions before a persons is allowed to call himself a 'bijzonder hoogleraar'. [...] All these positions are temporary, but for each position there are ten companies in line" (Interview ERW6)

The ERW2 does not have a policy to attract employees with specific experience in the business environment. The ERW2 makes use of tenure track, focuses on research competencies and lecturers should have proven themselves in research. Tenure track is a career path for academic staff that, if followed successfully, will lead to a professorship. For this reason the focus in general is on the scientific qualities of the employees. The two universities of applied science do have a policy to attract people from the business environment, which can be seen in the following quotes:

*"In the description of a new position at the ** the aspect of having business experiences is always included. It is part of the nature of this university and about 90% of the staff will in fact have business experience".* (Interview ERW1)

"The type of education [i.e. practice oriented] at ERW5 askes for employees with some business experience" (Interview ERW5)

5.2.3 Embeddedness

This indicator is measured by the questions where the primary strategic responsibility for entrepreneurship of the HEI is situated (5 point scale) and how many high-level managers are entrepreneurship champions. In the Figure 11, the scores of the higher education institutes are presented.

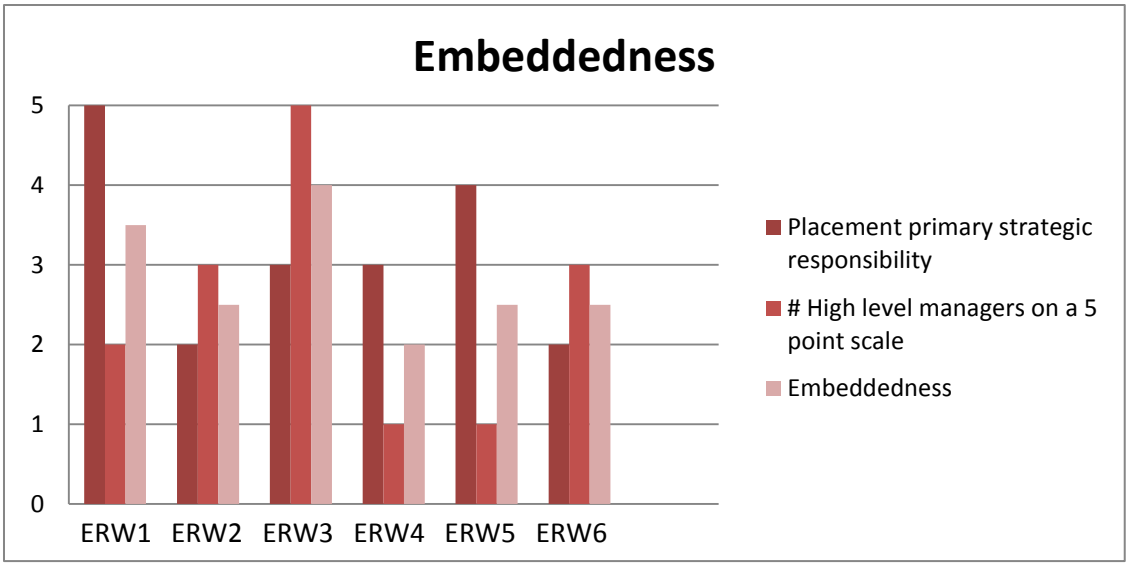


Figure 11. Embeddedness

Even though ERW3 scores relatively low regarding the primary strategic responsibility (score of 3), they counteract this by having many high-level managers acting as champions of entrepreneurship.

"There are 15 high-level managers consisting of: director education research, directors of science groups, professors, executive directors, and the management team."

The reason for a lower score on the primary strategic responsibility for entrepreneurship education for the ERW6 and ERW2 is that it is carried by the professor who is primarily strategically responsible, while at other HEIs higher ranking managers are primarily responsible. The higher scoring HEI's, such as ERW1 and ERW5 have in common that the primary strategic responsibility for the entrepreneurship education program is situated at the higher management of the education institute, the rector or provost of the institute. The HEI's which have a medium score perform have departmental deans who hold the primary strategic responsibility.

5.2.4 Overall results strategy

As Figure 12 shows, the ERW1 (4.33) and the ERW3 (4.22) rank the highest when looking at the overall strategy. Both HEI's have clearly written plans and embedded entrepreneurship in their strategy. The other HEI's have less developed clearly written strategies regarding entrepreneurship (education) and do not have a policy to attract employees from the business environment.

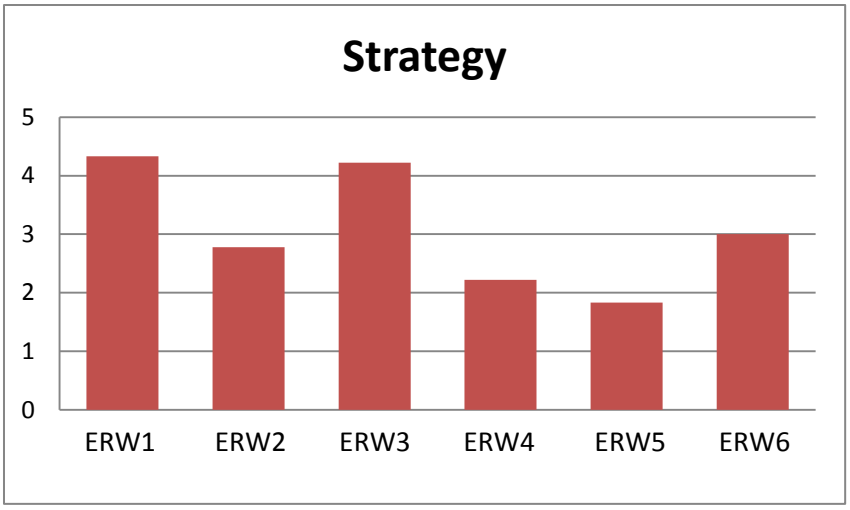


Figure 12. Overall scores on the dimension 'strategy'

5.3 Resources

This section will cover the results of the HEI's on the indicators that measure the dimension resources. First the indicator allocation is discussed which is followed by the type of sources and finishes with the indicator self-generated income. At the end of the results of this section, the average overall scores by the HEI's on the dimension resources are presented.

5.3.1 Allocation

The indicator allocation is measured by the questions whether the budget, allocated by the HEI, for the current entrepreneurship education program is sufficient and whether the budget for new entrepreneurship program initiatives is at a satisfactory level. There are only minor differences in scores regarding the sufficiency of the budget for the current entrepreneurship education program and new entrepreneurship education related initiatives.

All HEI's mentioned in the interview that the current budget for entrepreneurship education is at least sufficient. The ERW2 and ERW3 mention that the budget was very sufficient and they agreed that there was enough superfluous budget for stimulating new initiatives. For these two reasons, both HEI's score high on the indicator allocation. New initiatives for entrepreneurship education are stimulated with a budget as becomes clear from the following quote:

"If you have a good idea, the money will be available." (Interview ERW3)

The HEI's which score relatively low on this particular indicator, ERW5 and ERW4, do mention that there is sufficient budget, but that there is little money for new entrepreneurship education related initiatives. The following quote from ERW4 supports this:

"We receive funds for our entrepreneurship education programs from outside of the university. The most people are paid from external money. Most of the time it is hard to get money from external sources for extra or new projects. It would be a dream to have superfluous budget for initiating new entrepreneurship education related projects."

5.3.2 Types of sources

The portfolio of income sources for the entrepreneurship education program is one of the indicators that is part of the dimension resources. It is also important to have resources available over a longer time. The diversity of income sources that form the budget of the higher education institutes are shown in Table 9.

Table 9. Division and share of sources of income

	Own activities	Institution budget	Governmental funds	Benefactors	Other
ERW1	20%	20%	60%		
ERW2		25%	75%		
ERW3		30%	70%		
ERW4	10%	10%	70%	10%	
ERW5		90%	10%		
ERW6		60%	20%	10%	10%

The ERW6 and ERW4, in contrast to the other higher education institutes, have four types of income sources. The other institutes have two or three types of income sources. The ERW5 appears to be a special case in this overview, as the main source of income is the institution budget. Again, this has probably to do with the fact that the ERW5 only exists for four years now and is still working on manifesting their presence in the region. This also implies that options for governmental funds and other types of external sources are being explored at this stage. Also the ERW6 appears to differentiate itself from the other HEI's. Where most other higher education institutes mention governmental funds as the main source of income, the ERW6's share of institution budget is the largest, probably because of their embeddedness of entrepreneurship courses throughout their study programs. They are also the only HEI which mentioned other sources.

When looking at the type of sources, the conclusion can be drawn that higher education institutes have either two, three or four different sources of income. When taking the time of the availability of the biggest sources of income into account, differences can be identified. In contrast to the ERW6 and the ERW1, the ERW2 and ERW3 which score relatively low, due to their shorter amount of time for which the budget is available. We can conclude, on the basis of how long the

largest sources of income are available to the program, that ERW6, ERW1 and ERW4 have good portfolios of types of income sources.

*"At the ** most money comes from other sources than our own institution, governmental funds are quite easy to get and are usually available for a longer period [several years]. [...] We could be more creative in our own activities, but since there is a relatively stable source of income, we are not forced to search for other options"* (Interview ERW4)

Even though the budget is sufficient at the time, concerns for the future are present at all institutions. Especially with respect to the governmental funds, which have been high due to projects such as 'Gelderland valoriseert'. In the coming years this type of source of income will decrease and will therefore have an effect on the budget for entrepreneurship education.

5.3.3 Self-generated income

The higher education institute who stands out, is the ERW6. They mentioned to be involved in four types of self-generating activities, for example publication revenues, one time donations from people (mostly alumni) and fees for seminars and workshops. Other HEI's are involved in either fees for seminars and advisory services (ERW1 and ERW2) or donations from other people (ERW4). ERW3 and ERW5 both do not have self-generating activities. There were no specific reasons for not to engage in self-generating activities.

5.3.4 Overall results resources

As Figure 13 shows, the ERW6 scores slightly better than the ERW1 and the ERW2. Due to their divers types of income, longer of availability and ways of creating self-generating income, the ERW6 stands out as best scoring HEI on the dimension resources. The ERW5 scores low, but has a large potential to develop themselves. The ERW5 only exists for four years and therefore are in phase of experimenting what works for them and what not. Even though the ERW3 scores moderate on types of sources and years of availability, their less developed way of generating income makes them score lower on this dimension less compared to other HEI's with similar scores on the first two indicators.

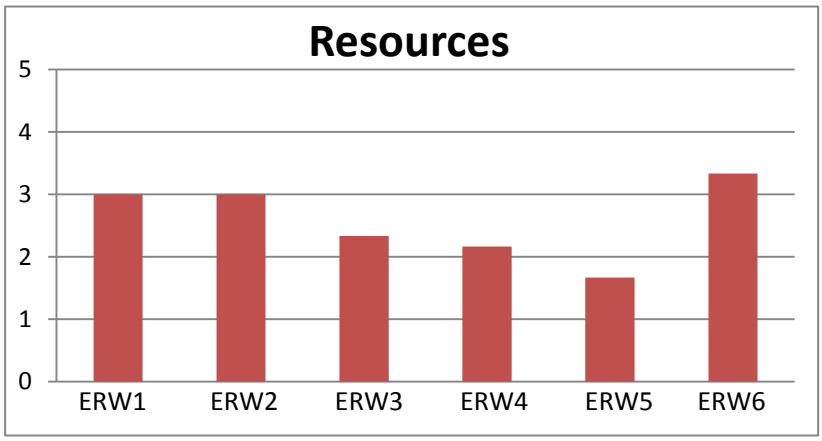


Figure 13. Resources

5.4 Institutional infrastructure

This section covers the results related to the dimension of entrepreneurship education called 'institutional infrastructure'. This dimension exists of three indicators which measure the dimension institutional infrastructure. The first indicator which is discussed is 'approach', which is followed by 'research' and finally the indicator 'level of cross-disciplines' is discussed. At the end of this section the overall average scores on the dimension institutional infrastructure are given.

5.4.1 Approach

The indicator approach includes the number of different facilities offered by the higher education institutes. It appears that there are some visible differences in the facilities offered by the different HEIs, see Table 10.

Table 10. Different types of facilities

	Chair group/ lectureship	Incubator facilities	Technology transfer office	Meeting place for students
ERW1	✔	✔	✔	✔
ERW2		✔	✔	✔
ERW3	✔	✔	✔	✔
ERW4	✔		✔	
ERW5			✔	
ERW6	✔	✔	✔	✔

There are three HEIs which offer all four facilities, namely ERW1, ERW3 and ERW6. They all provide a chair group or lectureship at their institution, have incubator facilities, a TTO and a meeting place for students. When looking at the best performing HEI, the ERW6, it appears that they facilitate all the different types of facilities mentioned in Table 10, whereas the ERW2 does not facilitates a chair

group or a lectureship at their institution. All the other facilities are present at the HEI ERW2 and are offered by Startlife.

It seems that a meeting place for entrepreneurship students is the least commonly used type of possible facilities to be used by the different HEIs. The most commonly used (by five of the HEIs), is the technology transfer office. The technology transfer offices are mostly responsible for liaison activities such as applying for subsidies or helping with the start-up of spin-off companies. The ERW1, the ERW3 and the ERW6 are the only higher education institutes offering a meeting place for students to exchange their entrepreneurial ideas.

5.4.2 Research

As mentioned before, the differences between universities and universities of applied sciences become visible when discussing things like knowledge transfer and research. The differences in nature between the two types of HEIs should be kept in mind when analysing and reading these results.

Within this indicator, the number of peer reviewed studies is taken into account. The number varies from ten entrepreneurship related peer reviewed studies (ERW6), to zero (ERW5). Also the ERW2 scores relatively high with seven studies. The ERW1 mentioned in the interview to have two peer reviewed studies, which is lower than the number of studies mentioned by the universities. The ERW1 tries to focus more on performing entrepreneurship related research, by attracting more people for the lectureship related to entrepreneurship. At the ERW5 there is currently less focus on entrepreneurship research, but more on establishing their entrepreneurship education program, but the ERW5 mentioned that there are high ambitions in this respect.

5.4.3 Level of cross-disciplines

This indicator is measured by the level of cross-disciplinary teachers, students and subsequently new courses developed by cooperation of multiple chair groups. The following figure (Figure 14) shows the number of disciplines represented by teachers and students.

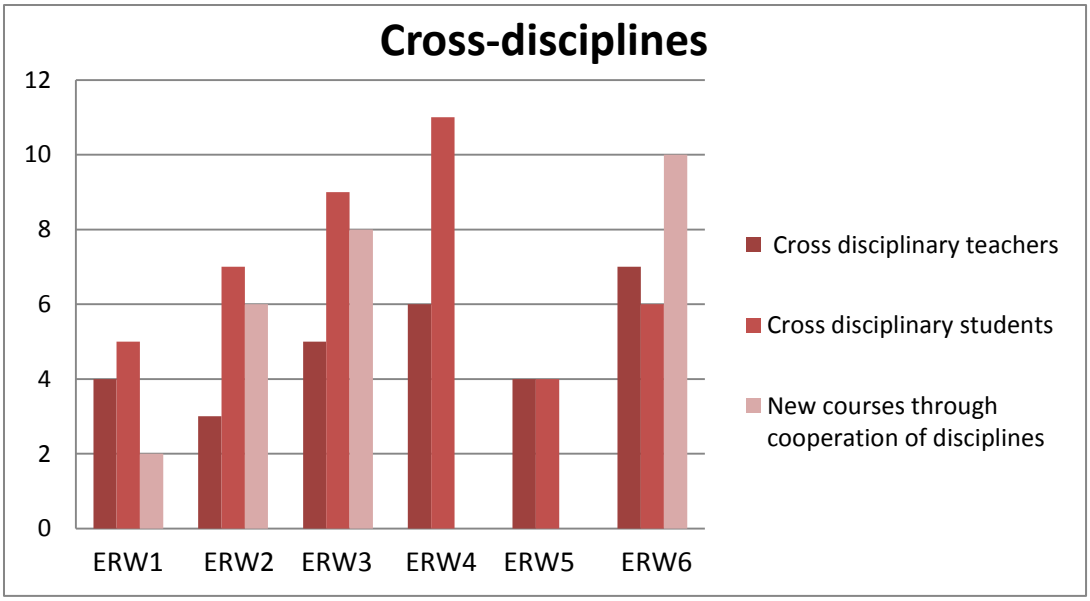


Figure 14. Cross-disciplines

As Figure 14 shows, there are a lot of differences between the higher education institutes when looking at the number of cross disciplinary teachers and cross disciplinary students. The ERW4 scores high on the number of cross disciplinary teachers as well as on the number of cross disciplinary students.

"For our course in entrepreneurship, all students from all faculties can sign up for the course. Everybody who has an innovative idea, or has the entrepreneurial spirit can take the course. Because of the open character of the course, a lot of different study backgrounds (from business to physics) are represented by the students." (Interview ERW4)

Also the study guide of Small Business Management states the following:

"Das freiwillige Blockseminar „Unternehmensnachfolge" richtet sich an Studierende und MitarbeiterInnen aller Fakultäten ebenso wie an externe Interessenten, die sich für das betriebswirtschaftlich bedeutsame und spannende Themengebiet Unternehmensnachfolge interessieren."

In short, the course is particularly aimed at non business students and external people who want to enrol in the entrepreneurship course (which is extracurricular). They reach a lot of students from different backgrounds, as is also the case at the ERW3 and ERW2. The number of cross-disciplinary teachers is highest at the ERW6, where entrepreneurship is taught at several faculties and by teachers with different backgrounds which teach in one course.

The third question that measures the level of cross-disciplines is the development of courses by cooperation of multiple chair groups. However, the numbers involved are influenced by the

longevity of the entrepreneurship education program. New entrepreneurship education programs most probably need to develop new courses, whereas older entrepreneurship education programs already have developed entrepreneurship courses a longer time ago. The ERW6 is the best performing HEI when looking at the number of courses developed by cooperation of multiple disciplines. The ERW6 mentioned in the interview that teachers from different groups or faculties work together to combine their knowledge and expertise on the broad field of entrepreneurship.

"Since the course Entrepreneurship: making a business plan is also given to for example to Biology students, the content of the course it built in such way, it suits the background of the students. The only way to do so is to work together with other departments." (Interview ERW6)

Examples of courses developed by multiple chair groups at the ERW2 are those with law (IP and Technology transfer), marketing, and education and competences studies (Basics of entrepreneurship). Furthermore, there is a multidisciplinary course which also focuses on entrepreneurship called Academic Consultancy Training (ACT). Almost all students from all study programs at the ERW2 have to take this course. In groups of eight, students, all from a different study background, work on a case provided by a company. They get a chance of working in a real life setting and are coached by the company as well as the university. The ERW4 and ERW5 do not develop new courses through cooperation of multiple disciples. When new courses are developed they are built by the school of management (ERW4) or by the teacher who is responsible for the course (ERW5).

5.4.4 Overall results institutional infrastructure

When looking at the overall scores of the dimension institutional infrastructure (Figure 15), it becomes clear that the ERW6 scores better than the other higher education institutes. This is mainly due to their high scores on the indicators approach and research. Where other HEIs score better on the indicator cross disciplinary students and teachers, the ERW6 also scores well on the number of courses developed by cooperation by multiple chair groups. The ERW3, ERW2, ERW1 and the ERW4 score moderate on this dimension.

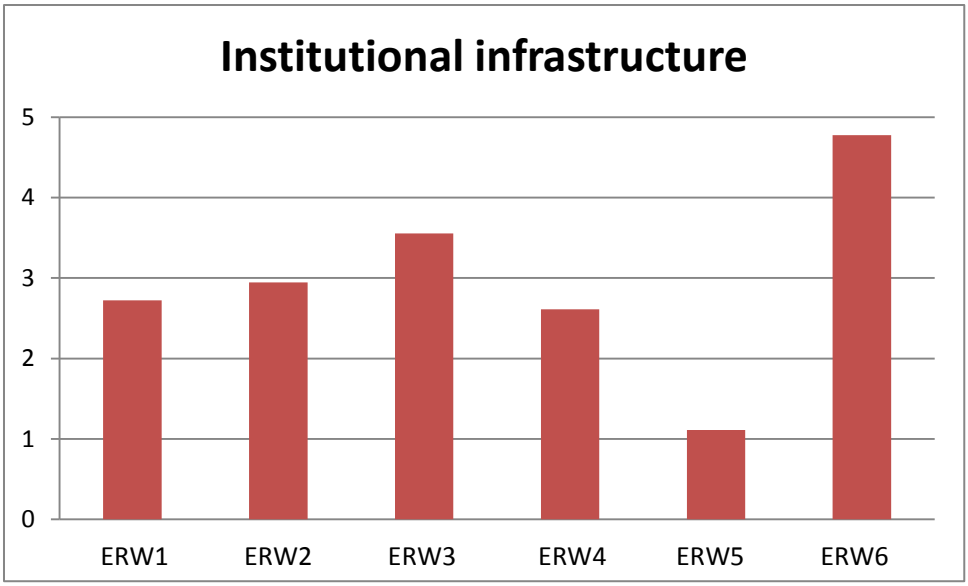


Figure 15. Overall score dimension institutional infrastructure

5.5 Education

In this section the results for the dimension education are discussed. The dimension education is measured by the indicators education scope and education set-up.

5.5.1 Education scope

The supply and demand of entrepreneurship courses are covered separately in the following two sections: types of education offered and student volume.

Types of education

The indicator education scope is measured by two aspects. The first aspect is the different types of education offered by the education institute. Table 11 shows the different types of education offered at the different higher education institutes.

Table 11. Types of education

	Individual courses	BSc. Minor	Full Bachelor	MSc. Minor	Full Master	PhD	Other
ERW1	✔	✔	✔				✔
ERW2	✔	✔				✔	
ERW3	✔	✔				✔	✔
ERW4	✔	✔	✔			✔	
ERW5	✔						
ERW6	✔	✔	✔	✔		✔	✔

The ERW5 does not offer any other type of education besides individual courses. There are no minors offered, but they are working on integrating entrepreneurship more in their curriculum. Their score

on this indicator and therefore also on the whole dimension, is affected by the fact that they only exist for four years now.

All the participating HEIs offer individual courses and two out of seven have a full Bachelor in entrepreneurship. These bachelor programs are called something like 'Small Business (and Retail) Management' (ERW1, ERW6), where entrepreneurship plays a constructive role in the curriculum of the bachelor program. All HEIs, except the ERW5, offer BSc. Minors in which students can choose for a certain amount of more or less interrelated courses in entrepreneurship.

The ERW1 and the ERW4 both teach a very intensive course on entrepreneurship, even though the structure of these courses are completely different. The similarity of the courses are is found in the fact that both courses are spread over a longer period of time (at least six months) and are very intensive. Both courses teach in how to become an entrepreneur by starting up your own company. At the ERW1 this is called Student Company:

"As soon as your second year starts, you will start your own business, called a 'Student Company'. During the project, the student company puts a group of 6 to 8 students to form an unique company with a management team. They come up a product or service with the aim of creating added value. They find a matching market, do market research and make revenue forecasts. By selling shares, they provide their own venture capital. The students have to deal with real problems, disappointments, successes and will mainly learn to think in terms of solutions. At the end of the year the balance will be made and the students have to explain their choices to the shareholders. After the settlement, the student company is shut down. However, it is increasingly common for students, who are enthusiastic enough, to make a new start with their student company." (Site ERW1)

At the ERW4, in contrast to the ERW1, the course is completely extra-curricular. Students, but also teachers, PhD students and even 'regular' people who are not enrolled at the university can take the course which is taught during the weekends.

"Entrepreneurial success is not only based on technical expertise, but also on the development of the business idea. The personality of a founder has just as much influence on his successful start in a business as having legal knowledge. The "Entrepreneurship Orientation Course" offers a "comprehensive view" about self-employment. This is reinforced by training skills for starting a company but also training essential entrepreneurial competencies. The course participants are educated to be able to start their own company. [...] The complete course "Entrepreneurship Orientation" extends over a period of seven months. About 140 hours are taught. The course is taught mostly all day on weekends and occasionally in the evening during the week instead". (Interview and site ERW4)

The only HEI which provides a MSc minor in entrepreneurship is the ERW6. They offer most Science oriented students the possibility to enrol in a track called Management and Technology in which entrepreneurship plays a central role:

"This minor takes up approximately half the time available in a regular two-year science master. Students study concepts and theories from organization studies, business administration and entrepreneurship. Students learn to understand and analyze problems of organizations in an environment affected by science and technology. Finally, students learn how to communicate with people with different backgrounds and interests. This critically complements the science master and will make students especially attractive for jobs on the crossroads between science and business, either in research, business or government settings." (Site ERW6)

All universities within this sample offer an PhD in entrepreneurship. Possibly due to the nature of universities of applied sciences, they do not have a PhD position in entrepreneurship. However, it is possible to have PhD students at universities of applied sciences as well. But such cases were not found in this benchmark study.

An example of the category other is the honours program at the ERW1. From this year on, excellent students can enrol in the honours program with a special focus on entrepreneurship.

"The honours program is for top students who are self-consciously and entrepreneurial in approach and who can work together effectively. Students who already have a firm foundation laid in their own BA training and constantly seek additional knowledge that they need themselves. Students who wish to contribute to the innovative capacity of the profession. For students who use their talent and passion to create a sustainable and innovative contribution to the field. This contribution may constitute a new concept, but also a concrete product or service. [...] The process starts with the visualization of your passion, talent (where your current program will play a role) and personal development goals with a personality program. Then starts an intensive process of team development. You remain together as a group students for half a year and you there must be able to work together and to have clear agreements about the approach, potential problems ahead, goals, etc. The next step in the program is to take action. Based on personal passion, preferences and contents form a guild, a small 'action team', which you with to your innovative idea into a real-life case to get started." (Site ERW1)

The best scoring HEI on this indicator is the ERW6. They mentioned in the interview to have six of the possible types of education and are the only HEI which offer a MSc. Minor in entrepreneurship. In the interview it became clear that entrepreneurship is mostly embedded in the curriculum and that almost every faculty teaches students in entrepreneurship. Especially the fact that they also have embedded entrepreneurship in their Master programs as well, really creates a distance between the ERW6 and the other HEIs.

Student Volume

Besides what the education institute offers it is also important to know what the demand for entrepreneurship education is. As mentioned in the section on the actual performance of the HEIs, the student volume is measured by taking the absolute number of students per course, multiplied by the number of entrepreneurship courses. This, in turn, is divided by the total number of students at the HEI, in order to get a more comparable result. Table 12 shows these results.

Table 12. Student volume

	(1) Absolute number of students	(2) Size of education institute	(3) Relative share of students = (1)/(2)	(4) Average ECTS per course	Student volume = (3)*(4)
ERW6	990	21300	0.0465	6	0.2789
ERW5	160	2614	0.0612	4	0.2448
ERW3	300	7100	0.0423	3	0.1268
ERW2	150	7298	0.0206	6	0.1233
ERW1	450	30000	0.0150	7.5	0.1125
ERW4	360	39000	0.0092	8	0.0738

Table 12 shows that looking at the absolute number of students, ERW6 has by far the largest share of students who follow entrepreneurship courses. Even after correcting this number for the size of the HEI, it still is the best scoring HEI on student volume. The ERW5 with 160 students (absolute), but much smaller size of the whole organisation (smallest HEI in the sample), performs relatively good after correcting for the size of the HEI. Within the sample of these HEI's, the number of ECTS per course varies from 8 (highest), to 3 (lowest). That this has an influence on the student volume can also be seen in Table 12 . The ERW6 remains the best performing HEI, with a relatively high number of students and an average number of 6 ECTS per course. ERW5, ERW3, ERW2 and ERW1 all cluster around the same student volume. The UDE shows most potential for improvement. With a low relatively share of students following entrepreneurship courses, which is due to the typical character of the main entrepreneurship course (see section Education), the ERW4 could improve on the indicator student volume.

The ERW6 score better than all other higher education institutes on the basis of the supply and demand of entrepreneurship education. They offer many different types of entrepreneurship education and the relative demand for these is much higher than in the case of the other higher education institutes. This can be explained by the fact that they make entrepreneurship part of all

study programs and create the opportunity to follow the entrepreneurship program simultaneously with the normal bachelor program.

5.5.2 Education set-up

For analysing the education set-up, the question what didactic methods are used for entrepreneurship education is taken into account. The first question measures the level of experimental teaching on a semantic differential line. The numbers should be interpreted as the position on a semantic differential line, with 0 meaning traditional education methods, 50 denoting teaching methods somewhere in between traditional and experimental, and 100 meaning the use of experimental methods.

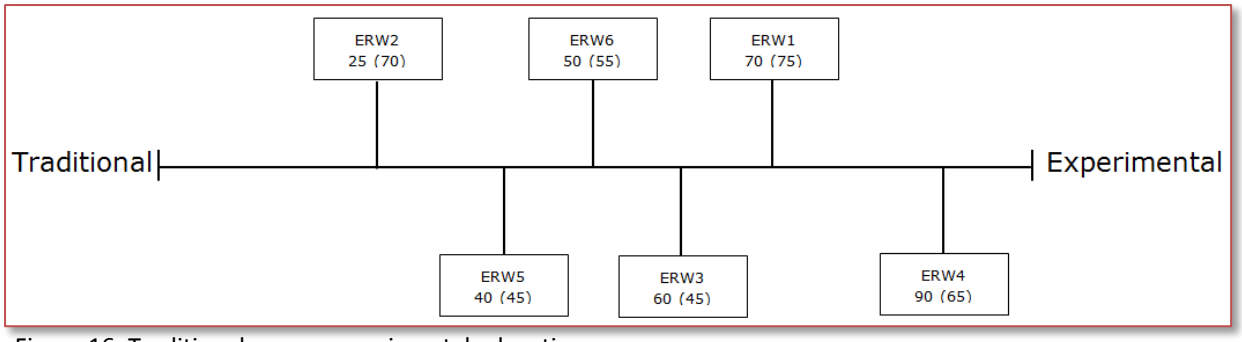


Figure 16. Traditional versus experimental education

The low score of the ERW2 can possibly be attributed to the fact that the methods of university education are limited by the rules of accreditation which have a more theoretical focus for university education, but this does not hold for the other universities.

Moreover, it can also be due to a difference in way of thinking. The respondent might determine the score based on the fact that they make it as experimental as possible within the limits set by the rules and nature of the institution and therefore indicate a high score. On the other hand, others might be focused on the fact that the score is limited by the nature of the institution (university as knowledge oriented) and are convinced that because of the experimental aspect it cannot be high and therefore they indicate a lower score. The content analysis of some of the entrepreneurship courses taught at the different higher education institutes also, in some cases, suggests other results. The very high indication of ERW4 on experimental teaching is not really reflected in the course guides and where ERW2 scores low in Figure 16, the content analysis suggests a higher percentage (between brackets in Figure 16). So these result have to be interpreted with caution.

Another question measuring the indicator education set-up is whether students are often confronted with real-life entrepreneurship problems. All HEIs answered positive on this question. Therefore the quantitative results do not yield much information. However, the examples given by

higher education institutes of how they confront students with real-life entrepreneurship education are interesting and are therefore presented below.

"By bringing students and entrepreneurs together, the entrepreneurial mind-set of the students gets influenced. By just receiving theoretical information without learning from practical examples, the mind-set of the students will not be shaped. But when interacting with real entrepreneurs and learning from especially the mistakes they made in their entrepreneurial activities, students get more practical insights and they can relate the theory better to real life. This is also one of the things which comes out positively in assessments, students mention that they really feel they learned from interacting with entrepreneurs [...] Also the Student Companies enable students to learn from real life situations" (Interview ERW1)

"In our course, students have to deal with all the problems which could also appear in a real life setting. They have to come up with their own innovative idea and write a business plan and learn how to raise funds. Failure or setbacks similar to real problems are obstacles they have to overcome in the course." (Interview ERW4)

Furthermore, questions were asked concerning the percentage of lectures that are given by guest lecturers, how much ECTS in practical experiences students attend and how often they are in contact with private companies.

Guest lecturers

The percentage guest lecturers varies from 80% of the total amount of courses (ERW4) to 10% of the total amount of courses (ERW5 and ERW6). What is interesting is that the best overall performing institutions (ERW6 and ERW2) make relatively little use of guest lectures. But the respondents mentioned that between courses there is a lot of variation between the percentages of guest lecturers. Some courses are really endorsed with guest lectures and some do not even have one guest lecturer. They also found it hard to really have insights in these percentages, because of these huge differences per course. A content analysis on some of the course outlines indicated that the respondent answered the question quit right and that there were no big differences. Overall the content analysis showed slightly higher percentages.

The number of credits for practical experience in the field of entrepreneurship (for example internships) varied between 30 credits (ERW5) to 0 credits (ERW4). The ERW4 mentions that all the practical experience is extra-curricular. Students can receive guidance and support, but they do not get credits for it. The following quote from the ERW4 shows the opinion of one of the respondents:

"I am of the opinion that students who want to learn more about entrepreneurship should be motivated to the extent that they do not bother not getting credits for it, but only do it to become successful entrepreneur". (Interview ERW4)

The ERW1 scores the highest on the number of credits, because of the internship within the program Small Business and Retail Management, were students really have to work in the business environment. The other HEIs either have 6 (ERW2 and ERW3) or 12 (ERW6) credits for practical experiences.

Contact with private companies

When looking at the number of times student are in contact with private companies, the results do not deviate from each other that much. As mentioned before the ERW4 has the largest percentage of guest lecturers and therefore it is not strange that they also have the largest number of students being in contact with a private company. With 15 times, the ERW4 is the HEI with most contact moments between students and companies. The ERW5 mentions that their students with an average of three times come in contact with a private company. This offers them room for improvement, since the other HEIs have more contact moments between students and private companies. The other HEIs have an average of 10 times of getting in contact with a private company. Getting in contact with private companies is illustrated by visits on site, getting in touch with people from a company as supervisors for a project, business presentations and other activities.

"For the course Academic Consultancy Training, students are coached by a professional, but also in other courses students get in touch with entrepreneurs through guest lecturers or assignments, such as interviewing an entrepreneur". (Interview ERW2)

*"At the ** students come in contact with entrepreneurs via guest lectures, but also through the student company where entrepreneurs act as coaches. Also other more practice related activities (excursions) are examples of moments where students get in touch with entrepreneurs."* (Interview ERW1)

5.5.3 Overall results education

As Figure 17 shows, the ERW6 is the best scoring HEI on the dimension education. This could imply that the dimension education is a good estimator of the performance. Especially because of the fact that they outperform all other higher education institutes on the basis of the supply and demand of entrepreneurship education, their score on this dimension is higher than others. The ERW6 scores neutral (medium) on the indicator education set-up, where the ERW1 scores better. This is also reflected in the figure below. By implementing entrepreneurship in the curriculum, as done at the ERW6, more students will get affiliated with entrepreneurship and HEIs will score better on this performance. The remarkable note which has to be made is that, as a good performing HEI, the ERW2, does not reflect this in the score on the dimension education.

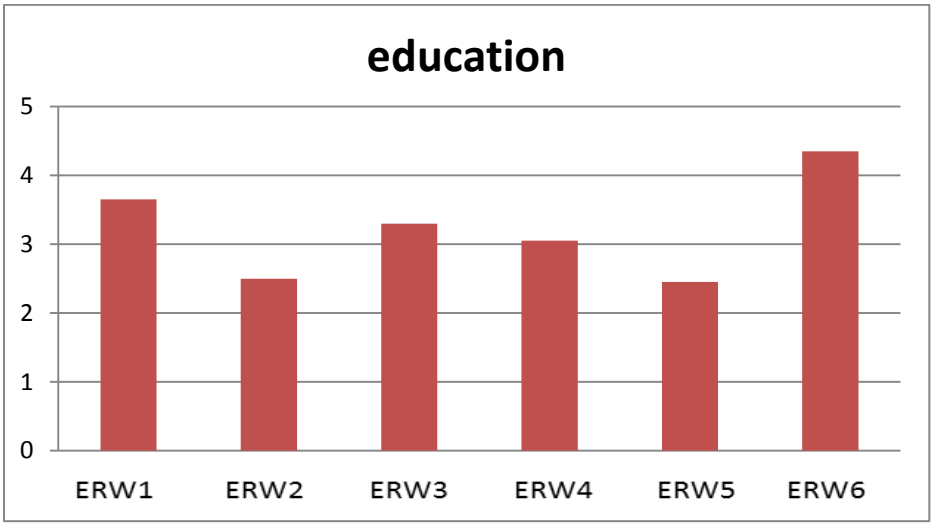


Figure 17. Overall score on the dimension education

5.6 Outreach

This section covers the dimension of entrepreneurship education called outreach. To analyse this dimension, the indicators 'links with stakeholders', 'community' and finally the indicator 'alumni' are discussed separately. At the end of this paragraph an overall score on this dimension is presented.

5.6.1 Links with external stakeholders

There are many differences between higher education institutes with regard to the contacts with external stakeholders. In the following Table, the links with stakeholders and their contributions to the education program are presented. Examples of contributing to the entrepreneurship education program can be financial contributions, guest lectures, helping with the set-up of the program, etcetera.

Table 13. The links with external stakeholders and their contribution to the program

	Government	Foundations	Entrepreneurs	Science parks	Private companies	Investors	Other
ERW1	✔ ✔	✔ ✔	✔ ✔	✔	✔ ✔	✔	✔ ✔
ERW2	✔ ✔	✔ ✔	✔ ✔	✔ ✔	✔ ✔	✔ ✔	✔ ✔
ERW3	✔ ✔	✔ ✔	✔ ✔		✔ ✔	✔ ✔	
ERW4	✔ ✔		✔ ✔	✔	✔ ✔	✔ ✔	
ERW5	✔ ✔		✔ ✔		✔ ✔		
ERW6	✔ ✔	✔ ✔	✔ ✔	✔ ✔	✔ ✔	✔ ✔	✔ ✔

✔ : has links with ✔ ✔ : also contributes to the program

The ERW2 and the ERW6 both mention to have links with all stakeholders and that all these stakeholders contribute to the program and therefore score well on this indicator. Another additional

remark on these two good scoring HEIs is that almost all contributions (besides investors) exist of financial as well as other contributions. This is not the case at all HEIs, even for those who also have links with many different external stakeholders. The ERW5 scores lower on the number of links with external stakeholders, but they mentioned that they are working on sending out a questionnaire to the surrounding private companies, in order to figure out what the options are for collaboration for example. They are in the phase of developing and establishing their position in the region and are working on their links with external stakeholders. The chamber of commerce is often mentioned as other external stakeholder. The ERW1 also mentioned their cooperation with other HEIs, who contribute in developing new ideas for courses.

"For most of the links holds that there is often a transaction of money involved, but also another type of transaction. Sometimes this is reflected in joint research, but also easier access to guest lecturers or business cases are ways of how our external stakeholders contribute to the program." (Interview ERW6)

*"At the ** the patent office (government) provides guest lectures for students and representatives of science parks provide coaching for post-graduates who want to start a new venture."* (Interview ERW2)

Another aspect which is measured within this indicator is the number of students who are active in entrepreneurial events *outside* the HEI. The ERW3 scores well on this aspect, they mention that their students continuously are involved in for example business competitions. Also the ERW6 performs well on the number of students involved in activities outside the institution. The ERW5 and ERW4 score lower on as well the number of links as well as on the number of students involved in entrepreneurial activities outside the institution.

"It is not seen as our core business to encourage our students to enter business competitions. Sometimes the local bank (Sparkasse) has some competitions and then sometimes students enter these competitions, but we do not really know anything about the number of students who do so" (Interview ERW4)

5.6.2 Community

The involvement of the education institute with the community is measured by the knowledge transfer and other ways of contact with society. Knowledge transfer is measured by third flow of funding and patents. The scores on patents are not comparable because there are major differences that can be attributed to the differences in nature of universities and universities of applied sciences. The ERW1 and the ERW5 did not apply for patents whereas the ERW3 has 55 patents according to the World Intellectual Property Organization (WIPO). The percentage of third flow of funding is calculated from the annual financial plans of the higher education institutes. The range varies from 15.7% (ERW5) to the highest scoring HEI with 32.8% (ERW6). The ranking based on percentage of

third flow of funding shows that the WU and the ERW6 score the highest with 32.8% and respectively 30.2% of the income obtained from third parties. Both universities of applied sciences score lower than the other HEIs in this sample. A reason for this could be that at the academic university the focus is more on research and fundamental knowledge, capacity and facilities that support fundamental research. This ultimately leads to third parties investing their money in contract research done by the university (CBS, 2006).

Besides knowledge transfer in the form of patents and third flow of funding, one can also transfer knowledge by having an advice centre for entrepreneurs, visiting schools, organize open entrepreneurial events, training for entrepreneurs like boot camps on a local or even international level. The following figure shows all activities that the higher education institutes offer or are engaged in.

Table 14. Type of other community activities

	Advice centre for entrepreneurs	Activities in schools	Open entrepreneurial events	Training for entrepreneurs / companies	International scale
ERW1	✔	✔	✔	✔	✔
ERW2	✔	✔	✔	✔	✔
ERW3	✔	✔			✔
ERW4	✔				✔
ERW5	✔				✔
ERW6	✔	✔	✔	✔	✔

There are three HEIs which are engaged in, or offer all the activities mentioned in Table 14. The ERW1, ERW2 and ERW6 can be seen as good practice examples when discussing entrepreneurship related to community engagement.

*"The ** offers several facilities to other people besides students. The ** Ondernemersdesk and Centre for Entrepreneurship (CVO) also give advice to start-ups and try to combine business with education. Entrepreneurs can reach out to the ** for support in starting up their company, or join forces in doing projects." [...] "The CVO also participates in various regional projects in order to educate and train (future) entrepreneurs and schools. Consider the IkStartSmart project. We are part of an extensive network and there is frequent contact with foreign universities to exchange knowledge and experiences, the CVO also guides (innovative) start-ups when entering the market." [...] "Summer schools are organized in collaboration with the universties of Wageningen, Talin, Riga and Brunal and there are also contacts with HEIs in Estland, Canada and Muenchen in order for student to go abroad or to do joint research. [...] There are also entrepreneurship events in which entrepreneurs and small and medium sized companies are invited. These events often are centred around a theme and offer entrepreneurs and companies to extent their network"* (Interview and site ERW1).

The ERW4 and ERW5 both only have an advice centre for entrepreneurs and are focused not only on a local scale, but also internationally. What is special about the course taught at ERW4, is that also citizens can enrol for the course. This is not particularly taken into account in this table, but is a good example of how to transfer knowledge to the community. By giving them the possibility to enrol in a course, knowledge is transferred in a way no other HEI offers at the moment.

5.6.3 Alumni

The best scoring HEIs on this indicator ERW6 and ERW2 both mention that they have a well-established alumni organization and also use alumni as possible target group for research.

*"The ERW6 has a special offer for graduates. They become a 'friend of the ** at the moment they graduate. The first year is free of charge for them, and offers them the possibility to enrol in three courses in the coming two years which are open for alumni. In this way they can keep their knowledge up to date and stay in touch with the **. [...] Alumni can also reach out to the ** for information about their career, but the ** also contacts them for participating in research. [...] The Alumnibureau (as it is called), offers several ways to keep in touch with graduates. They organise events, like alumni days and other network events, but also lectures and debates. [...] By using the site, graduates from the ** can find classmates or alumni within their field of interest"* (Interview and site ERW6)

The ERW1 also keeps track of the career of their alumni, but according to the interview it is not that well organized or accessible as at the ERW6 or ERW2.

*"For Small Business and Retail Management the alumni are not being monitored well enough. The centre for entrepreneurship does a better job at this, but still it is hard for us to filter for graduates from the ** who are involved in entrepreneurship. They could be used as guest speakers or as project advisors. This is a topic which needs more attention in the future. It should become normal for graduates to do something back, but it also difficult to do so if it is not clear what is possible." (Interview ERW1)*

Table 15. Alumni

	Keeping contact	Tracking alumni careers	Alumni as research sample	Other
ERW1	✔	✔		
ERW2	✔	✔	✔	✔
ERW3	✔			✔
ERW4	✔			
ERW5				✔
ERW6	✔	✔	✔	✔

The ERW5 is again a special HEI in this respect. At the moment of performing the benchmark interviews, the ERW5 did not have alumni yet. They mentioned that they are working on a way to

keep track of the graduates as soon as the first students graduate from the ERW5 at the end of this academic year.

Organizing the alumni in an organisation could also have benefits for fund raising activities. When alumni are still connected to their alma mater, by making use of an alumni organisation, alumni appear to be more willing to contribute in a financial matter as well (observation ERW2). Many other opportunities can be found for the other HEIs in improving their use of alumni as possible guest speakers, as sources for data mining or other research opportunities.

The ERW2, as good scoring HEI on this indicator, organizes their alumni in the organization called KLV:

*"An increasing number of KLV members are entrepreneurs or are interested in starting up for themselves. The educational courses at the ** are paying more attention to entrepreneurship as a career choice in its own right. KLV is accumulating statistical information about this group and is supporting (potential) entrepreneurs with various networking opportunities. The KLV is a partner in a variety of initiatives in this field"* (Site ERW2)

Also the number of alumni involved in entrepreneurship education varies considerably. The ERW2, with 27 alumni involved is the HEI with the most alumni actively involved in entrepreneurship education. The ERW4 mentioned to have 15 alumni involved in their education, even though they only keep track of their alumni (see Table 15). The ERW6 could improve their number of alumni as guest speakers, since they now mention to have 10. They have arranged it well, but could use this potential even more.

5.6.4 University-industry collaborations

Before presenting the results of this part of the dimension outreach, it is necessary to address some specific details about these results. As mentioned in the previous chapters, this is an additional part to the already existing benchmark study performed by NIRAS et al. (2008) and Blok et al. (2013). The operationalization of this indicator differs from the other indicators in this study and therefore these results should be interpreted as a separate part within this benchmark study. The data is more descriptive in nature and gives more insights in the topic of industry collaboration.

Several aspects are taken into account in this indicator. The first aspect is the motivation and need to collaborate. The ERW2 and ERW6 mention all four possible motivations for collaborating with industry, which are research funding, the possibility for students to learn from real life entrepreneurship problems, creating valuable intellectual property and having access to new

technologies. All other HEIs[3] mention two of the four possible answers. The open question about the need to collaborate can be roughly divided into two categories, the first category concerns the practical need for students and the second category adds the need for research opportunities as well. The ERW1, ERW4 and ERW5 relate the need to collaborate mostly to the practical experience of students which comes with collaborating with the industry. The ERW2 and ERW6 also mention this aspect, but also mention the need for additional funding and see the potential research opportunities when collaborating with the industry. New partners are searched for at open forums, referrals from colleagues and by using active internet search. There are no large differences between the HEIs, they almost all make use of these three sources to meet potential collaboration partners. Additional places to meet and/or search for new partners are network meeting such as business cafes (ERW2) visits to top 20 Dutch companies (ERW6) and via students who do their internship or thesis at a company which does not has bonds with the HEI yet (ERW2).

Another aspect of this indicator involves the type of collaboration the HEI has with industry. Many different forms of collaboration exist and having more than one type could imply a more wide spread basis for (sustainable) collaboration. The results show that there are four types of collaborations in which a distinction between the HEIs can be made. These four types are recruitment of graduates, spin-off creation, the creation of physical facilities and the licensing of Intellectual Property. The ERW2 and ERW6 are the only two HEIs which mention to have the last three mentioned types of collaborations with industry and therefore distinguish themselves from the other HEIs. ERW4 and ERW6 mention to also collaborate with the industry for the possibility of recruitment of graduates (see table 16).

The HEIs were also asked to indicate whether the types of collaborations they have with industry are executed on a formal or informal basis. Most of the types are arranged formally, such as joint research, consultancy/contract research and the licensing of IP. The ERW2 mentioned that there are almost always contracts involved when collaborating with industry and that therefore almost all collaborations are arranged in a formal way, even though there are some exceptions. There are no big differences between the HEIs considering the formal or informal character of the collaboration.

When looking at the aspect 'modes of governance', it appears that, as stated in the literature, the institutional and personal mode of governance co-exist. Joint research, interactions in meetings and guest lecturers are types of collaboration which predominantly are governed at a personal level. The results show that this does not mean that these collaborations have an informal character, but can also be formal arrangements. Student placements is the only type of collaboration

[3] The ERW3 is not taken into account in this part of the study, because they did not respond to the request in time.

which predominantly is arranged at an institutional level. All the other types are more or less equally divided between personal and institutional.

Table 16. Type of collaboration, informal/formal and personal/institutional

	Joint Research		Recruitment		Placement		Interaction		Guest lecturer		Consultancy		Spin-off		Facilities		Training		Licensing	
	i/f	p/i	i/f	p/i	i/f	p/i	i/f	p/i	i/f	p/i	i/f	p/i	i/f	p/i	i/f	p/i	i/f	p/i	i/f	p/i
ERW1					i,f	i	i	p	i,f	p,i	i,f	p,i					i,f	i		
ERW2	f	p,i			i,f	p,i	i,f	p	i	p	f	p,i	f	i	i,f	i	i,f	p,i	i,f	i
ERW4	f	p	i	p	f	i	i	p	i	p	f	i					i	p		
ERW5	f	p,i			i,f	p,i	i,f	p,i	f	p,i	f	p,i								
ERW6	f	p,i	i,f	p,i	i,f	p,i	i,f	p,i	f	p,i	f	p,i	f	p,i	i,f	p,i	f	p,i	f	p,i

As the literature showed, there are several drivers and barriers for a successful collaboration between a HEI and the industry. The participants were asked to take a successful collaboration in mind and were asked to describe what made this collaboration a success. The coded answers given by the HEIs can be placed in two different stages of the collaboration process. The first category contains those drivers which are more important in the first two phases (pre-linkage and establishment) of the collaboration model by Plewa et al. (2013) or the stages 'developing a joint working group' and 'formalize agreement' in the model by Elmuti et al. (2005). These drivers are mutual interest (ERW5) and a win-win situation (ERW1), also time and money available (ERW4) and having a clear and explicit agreement on the mutual expectations (ERW2) are mentioned as possible drivers. The drivers for a successful collaboration which are more situated in the less practical stages, but more advanced stages are described as " a long term relationship, not just a hit and run" (ERW6), personal bonding between two parties (ERW4), regular informal contact (ERW2) and closely keeping track of each other's needs and wants (ERW6).

"Make very clear and explicit agreement in advance of the collaboration on the mutual expectations and follow up. [...] Make sure there are regular informal contact moments to ensure the relevance of the collaborative work" (ERW2)

"It is important that there is interest from both parties and that there is time and money for the project" (ERW5)

When presenting the participating HEIs with possible drivers, almost all possible drivers were identified as applicable for the HEIs. Only the drivers 'previous experience' (ERW4, ERW1, ERW2) and 'breadth of interaction channels' (ERW5, ERW1, ERW6) were not identified as drivers by all higher education institutes.

Table 17. Drivers for successful collaboration

	Trust	Communication	Understanding	Inter personal skills	Previous Experience	Breadth of interaction channels
ERW1	✔	✔	✔	✔	✔	✔
ERW2	✔	✔	✔	✔	✔	
ERW4	✔	✔	✔	✔	✔	
ERW5	✔	✔	✔	✔		✔
ERW6	✔	✔	✔	✔		✔

The same question was asked in search for barriers for successful collaboration with industry. The answers varied considerably, from 'misunderstanding of industry about how research works' (ERW5) to 'nothing to gain anymore' (ERW1) and 'lack of a clearly written agreement' (ERW2). The ERW6 gave the following example:

"We did not ask what topic they (the industry) exactly wanted on the agenda. We just showed our 6 research results of that particular group. They almost fell asleep..."

Several possible barriers were presented to the HEIs. These results show more differences between the HEIs compared to the results on the drivers for successful collaboration. The barriers 'communication difficulties' , 'differences in objectives' and 'differences in the perception of goal achievement' all received recognition by the participating HEIs, but there are also barriers which are not perceived (or less perceived) as being applicable to the HEIs. The barrier 'uncertainty' was not mentioned by any of the HEIs, where the short term orientation of the industry (ERW4, ERW1, ERW6), administrative procedures (ERW5, ERW1) and differences in institutional norms (public versus private knowledge) (ERW1, ERW6) were mentioned by some of the HEIs. As mentioned in the literature, barriers can be divided into two categories, namely, orientation and transaction related barriers (Bruneel et al., 2010). The HEI ERW2 mentioned that for them, the transaction related barriers are harder to overcome, whereas all the other HEIs mention the orientation related barriers. Reasons for this choice vary from the difficulty to overcome understanding problems (ERW1) to the personal character of a vision which is much harder to grasp than rules and regulations (ERW5).

Table 18. Barriers for successful collaboration

	Communication	Objectives	Goal achievement	Uncertainty	Orientation	Administrative procedures	Institutional norms
ERW1			✔		✔	✔	✔
ERW2	✔	✔	✔				
ERW4	✔	✔	✔		✔		
ERW5	✔	✔	✔			✔	
ERW6		✔	✔		✔		✔

The last aspect of this indicator concerns the evaluation of the collaboration and the indication of a successful collaboration. All HEIs mention that they do not structurally evaluate their collaboration processes with industry. The ERW5 mentions that informal/personal evaluations may be existing, but that there is no established way of evaluating. In addition, the ERW2 mentions that they make use of customer satisfaction surveys, but that these surveys are very general and do not provide in depth information about the opinions of the industry concerning their collaboration with the HEI. At some point in time there usually is a moment in which is decided upon the successfulness of the collaboration. The ERW6 mentioned that when there are follow up projects. This usually is a good indicator that the previous collaboration was a success. Also when it keeps bringing money in for R&D the collaboration is seen as a success by the ERW2, ERW5 and the ERW6.

5.6.5 Overall results outreach

As Figure 18 shows, the ERW2 scores best when looking at the dimension outreach. Due to their many links with stakeholders, their high community involvement and a well-structured alumni network, the ERW2 functions as a good example for other HEIs. Also the ERW6 scores well on this dimension. Because knowledge transfer is taken into account in this dimension, the universities of applied sciences are somewhat lagging behind. This difference in nature should be kept in mind when interpreting these results. As the ERW2 and ERW6 score well on this dimension as well as on the overall performance, one could argue that outreach is a dimension which can explain the good overall performance of a HEI. In order for the other HEIs to improve their performance, outreach is one of the dimensions which could be invested in.

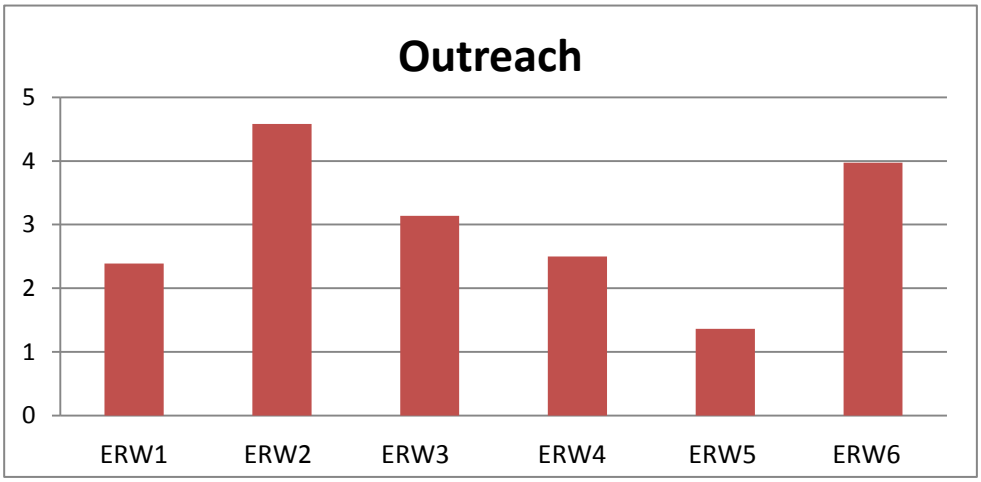


Figure 18. Overall score on the dimension outreach

5.7 Development

This last section covers the results of the dimension development. In this section the indicators 'user-driven improvement', followed by the 'evaluation of goals' and finally the indicator 'human resource investment' are discussed. At the end of this paragraph the overall results on this dimension are presented.

5.7.1 User-driven improvement

Within this indicator HEIs were asked to indicate in what way they evaluated their entrepreneurship program or courses. Table 16 gives an overview on their activities related to user-driven improvement.

Table 19. Types of evaluations

	Self-evaluation by teacher	Peer reviews	Student evaluations	Executive staff	Other
ERW1	✔	✔	✔	✔	
ERW2	✔	✔	✔	✔	✔
ERW3	✔		✔	✔	
ERW4	✔	✔	✔		
ERW5	✔	✔	✔		
ERW6	✔	✔	✔	✔	✔

All the higher education institutes make use of student evaluations and self-evaluation by the teachers. Self-evaluation of teachers, peer reviews and student evaluations are the most used types of program evaluations. Some higher education institutes also include other types of evaluation that can lead to program improvement such as executive staff evaluations.

*"At the **, the program director monitors the course evaluation outcomes. When a course scores bad, the program director tries to schedule an appointment with the involved staff (teacher, chair holder) of that particular course to discuss the outcomes and come up with possible improvements. When the course receives very good feedback, this is also forwarded by the program director."* (Interview ERW2)

This is also the type of evaluation that distinguishes the best scoring higher education institutes from the others. The ERW1, ERW2 and ERW6 are the best scoring HEIs when looking at the types of evaluations. Most of the HEIs send out evaluation questionnaires to their students and in some cases a group of students gives additional feedback in organized student meetings.

"In the last few years I have taught many different variants of our course on entrepreneurship [at the faculty technology and bionics]. We are constantly looking for ways to improve the course by actively involving students in the process. Also the teachers are self-critical and look for ways to improve the course. Especially because we are a new university of applied sciences, we need to constantly look for ways to improve our education." (Interview ERW5)

5.7.2 Evaluation of goals

The indicator evaluation of goals is measured by whether students' careers, stakeholder needs and goals achievement are monitored. The evaluations can be done in a formal (e.g. with systematic evaluation procedures) or informal way (e.g. meetings with stakeholders to discuss the strengths and weaknesses of the education program). Table 17 shows whether HEIs evaluate the three aspects (students' career, stakeholder needs and goals & strategy) and whether they do that formally, informally or both. In this report, we didn't took the level of intensity and frequency of the evaluations into account.

Table 20. Informal and formal evaluation of students' career, stakeholders and goals

	Students' career		Stakeholder needs		Goals	
	Formal	Informal	Formal	Informal	Formal	Informal
ERW1		✔	✔	✔	✔	
ERW2	✔	✔	✔	✔	✔	
ERW3		✔		✔	✔	
ERW4		✔		✔		
ERW5				✔		
ERW6	✔	✔		✔	✔	✔

Drawing from the table above, the overall good performing examples ERW2 and ERW6, are the only two HEIs who keep track of the students' career in a formal way. What makes the ERW2 the overall best scoring HEI on this indicator is that for all three aspects, they have a formal way of evaluating.

*"Each year a report is made, based on results from the alumni organisation (KLV), which shows the career path of graduates from the **. The KLV collects the data and draws tables and figures from this data, which show in which sector they work for instance. "* (Interview ERW2)

Where the students' career and needs of stakeholders are mostly evaluated informally, the goals and strategy are commonly evaluated more formally. Informal evaluations take place in conversations with for example companies, right after they gave a guest lecture. These informal interactions take place on irregular moments and rise to the occasion. This does not holds for formal type of evaluations, which mostly take place on a yearly basis.

*"Monitoring the students' career does not happen in a structural way. It is in development. There is an entrepreneurship scan, but only at the beginning of the minor and not at the end. So we cannot really speak of monitoring. The monitoring of the Euregio Rhein-Waal is a new initiative to be better able to measure this [...] Each program has a field commission (in Dutch: werkveld advies commissie) which is involved in the accreditation of the program and an assessment of the needs of stakeholders. More informal feedback is given for example when evaluating an internship of a student. [...] We are developing a baseline measurement at the ** to assess our goals. There will be multiple meetings in which the results of the instrument will be tested."* (Interview ERW1)

5.7.3 Investment in human resources

This indicator is measured by asking what incentives are present for encouraging lecturers to teach in entrepreneurship education and what recognitions for achievements are given. There are two higher education institutes, ERW2 and ERW3, which indicated to do something with recognizing achievements. But these scores are very low. The ERW2 is the only HEI which also encourages teachers to get more involved in entrepreneurship (education). The other higher education institutes offer no such incentives to stimulate entrepreneurship education among lecturers or offer rewards for those who do.

*"Once in every three years at the dies natalis of the university, an entrepreneurship award is given to a staff member of the ERW2 who sets an example in this field. More general awards at the **, in which entrepreneurship is also taken into account is the teacher of the year award and the academic year prize for research."* (Interview ERW2)

The respondents were unable to give the percentage of teachers trained for entrepreneurship education. However, the higher education institutes which were able to provide an answer indicated that either none of the teachers (ERW3, ERW4, ERW5 and ERW6) or ten per cent of the teachers (ERW2) received training for entrepreneurship education. The ERW1 with 50% is the exception. Most HEIs mention that there are regular education training events, but that there is no real

entrepreneurship related training. At the ERW1, the CvO (centre for entrepreneurship) makes sure that teachers stay up to date according to new insights or initiatives from the business environment. They try to have a pro-active attitude in training their staff.

5.7.4 Overall results development

As Figure 19 shows, there is one HEI which really takes the lead when looking at the dimension development. Due to the thorough way of evaluating their entrepreneurship courses, as well as keeping track of students' career, needs of stakeholders, evaluation their goals in a formal matter, and at least recognizing the efforts of entrepreneurship teachers, the ERW2 scores well on this dimension. Also the ERW1 and to some extent the ERW6 score relatively good, even though improvements can be made. All HEIs should do more with their investments in human resources, in order to be able to stimulate the extra efforts teachers make to become more entrepreneurial teachers.

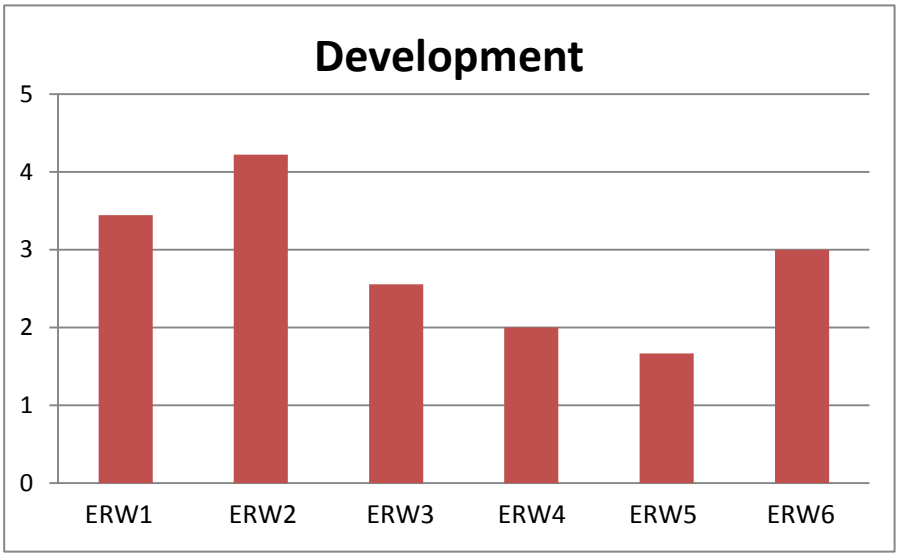


Figure 19. Overall score on the dimension development

6. Conclusions and recommendations

In this section the relationship between the performance and the dimensions of entrepreneurship education are discussed, based on the findings in this benchmark study. The second research question, "*What kind of research-based educational interventions can be formulated for managers at higher education institutes in the Euregio Rhein-Waal who want to start with or improve their entrepreneurship education program?*" and supporting sub-questions are answered in this chapter. Overall recommendations about how to improve the dimensions of entrepreneurship education are also given in this section. The good practices in this benchmark study are used as examples of how to give substance to the indicators that need improvement. The individual recommendations are presented for each HEI separately, because each may have different reasons for its (good or bad) performance and are presented in Appendix III.

6.1 Overall conclusions

In this section the overall conclusions are presented. First the conclusions regarding the best practices are given, subsequently the conclusions regarding the dimensions of entrepreneurship education are presented.

Performance

When looking at the results of the performance by the HEIs, the conclusion can be drawn that three types of HEI can be distinguished. The first type of HEI has excellent scores on one or more performance indicators (ERW2 and ERW6), another type of HEI has fairly constantly good scores (ERW1 and ERW3) and there are HEIs that are not among the best performing institutes on any performance indicator (ERW4 and ERW5).

The ERW6 is the best higher education institute on the indicator entrepreneurial students through education. This means that the ERW6 is the best practice HEI on the absolute overall score on performance. The ERW2 also has a high ranking due to the high performance on knowledge transfer and entrepreneurial students through practice. The large differences in the score on the performance indicator knowledge transfer can mainly be attributed to the difference in nature between universities and universities of applied sciences.

The HEI of applied sciences ERW1 scores fairly good on all the indicators, even though the HEI has a more practice oriented nature than most others in this study. The ERW1 scores second best on the performance indicators share of students with an entrepreneurial mind-set through education and on entrepreneurial students through practice. Because of its constant scores and being the best performing university of applied sciences the ERW1 will be used as a best practice together with ERW6 and ERW2.

The HEIs ERW4 and ERW5 do not perform well on any of the performance indicators. These HEIs have more points that need improvement compared with the other HEIs. The ERW3 scores moderate on all the performance indicators. It does not score high nor low and thus also has a potential to be improved.

The following Table shows the average results of each higher education institutes on the six different dimensions of entrepreneurship education. Based on these results the conclusions for the following part are drawn.

Table 21. Overall average scores on the dimensions

	Performance	Strategy	Resources	Infrastructure	Education	Outreach	Development	Overall dimensions
ERW1	2.6	4,3	3	2,7	3.6	2,4	3,4	3.3
ERW2	3.8	2,8	3,3	2.9	2.5	4,6	4,2	3.2
ERW3	3.2	4,2	2,7	3,5	3.3	3,1	2,5	3.2
ERW4	1.6	2,2	2,2	2,6	3.1	2,5	2	2.4
ERW5	1.8	1,8	1,7	1,1	2.5	1,4	1,7	1.7
ERW6	4	3	3,3	4,8	4.3	3,9	3	3.8

Strategy

The ranking of best practice entrepreneurship education programs by higher education institutes is not reflected in the scores on the indicators of strategy. The data of our benchmark study thus does not endorse the findings in the report of the European Commission (NIRAS et al., 2008), which is that the dimension strategy is crucial to a successful entrepreneurship education program. On the other hand, Blok et al. (2013) also did not find these results, so the results are in line with the findings by Blok et al. (2013). The dimension strategy yielded big differences between the different higher education institutes. There are three indicators that comprise the framework condition strategy. The findings indicate that the HEIs can focus on different indicators in order to establish a high performing entrepreneurship education program.

ERW1 is a clear example of a high performing education program which is operationalized in clearly written entrepreneurship education policy plans which are implemented in the various departments of the HEI. Furthermore, it is recommended that the highest management levels of the university should be strategically responsible for the program and that entrepreneurship champions are involved in the development and dissemination of the program. The other two good practice HEIs, ERW6 and ERW2, have no clearly written goals and strategies related to entrepreneurship and moreover, there are also differences in the way entrepreneurship is embedded in the higher education institutes. The best performing HEIs (ERW6 and ERW2) have moderate management levels which are primarily responsible for embedding the entrepreneurship education program (professor).

The results of ERW2 and ERW6 might imply that the implementation of entrepreneurship education is possible without its implementation at a strategic level. On the other hand, the third good practice HEI, ERW1, does score high on the dimension strategy and the study by NIRAS et al. (2008) also shows a positive link between the dimension strategy and the good practice examples.

Resources

The dimension resources does not yield major differences between the HEIs. However, the good practice entrepreneurship education programs do score well on the indicators of the dimension resources as well.

When looking at the total scores on the dimension resources, it cannot be stated that these scores are typical characteristic of the performance of the entrepreneurship education program. NIRAS et al. (2008) state that having insufficient resources is the biggest obstacle in (implementing) entrepreneurship education programs. However, the findings in this study show that this is not the case with the sample in this study. This might be due to the fact that the policy is already implemented and the financial support is provided as well.

The findings regarding the importance of entrepreneurship related income activities in this report endorse the earlier findings by NIRAS et al. (2008). The good practice higher education institutes engage in money generating activities related to entrepreneurship whereas the ones lagging behind do not engage in these activities. Even though the share of total income represented by these activities is low, all the good practice higher education institutes are engaged in these activities.

Institutional infrastructure

In line with the findings presented in the report for the European Commission (NIRAS et al., 2008), the dimension institutional infrastructure shows large differences between the higher education institutes. It appears that the good practice entrepreneurship education programs have good scores on the dimension institutional infrastructure.

The good scoring HEIs on this dimension (ERW6, ERW1 and ERW2) offer many facilities and have a high level of cross-discipline structures. But also the moderate scoring HEIs have a high level of cross- discipline structures. Therefore it seems that an effective entrepreneurship education program needs a high-level of cross-disciplinary structures combined with sufficient facilities to support the program. Especially ERW6 has a good foundation for entrepreneurship education with a chair group dedicated to entrepreneurship, a multidisciplinary approach and sufficient resources.

Education

The good practice higher education institutes show average scores regarding the level of experimental teaching and students confronted with real-life entrepreneurship problems. A striking result is that the good practices do not use many guest lectures, even though they state that they confront students with real-life entrepreneurship problems. This implies that they use other ways to confront students with real-life entrepreneurship problems besides guest lectures, and these other ways appear to be successful. Frequently mentioned teaching methods were: case studies and business plan competitions.

The number of different types of education offered by the education institutes is not a specific characteristic of their final performance. The lower performing higher education institutes do not offer less types of education than the good practices. Because the lower performing HEIs do not offer less different types of education, improvement needs to be found in for example creating more demand for the courses.

Outreach

Where NIRAS et al. (2008) did not find clear relationships between high scores on outreach and the performance of the entrepreneurship education program, this study shows that the good practices (ERW6 and ERW2) are highly involved in outreach. The university of applied sciences ERW1, does not show this strong relationship.

Most of the benchmark participants are well aware of the importance of outreach. But where findings by NIRAS et al. (2008) indicate alumni as a natural starting point for outreach, in our study this does not hold. In most cases the network of stakeholders is fairly well managed but the alumni are not fully used for entrepreneurship education. When looking at the different indicators of the dimension, interesting results can be identified. The higher education institute ERW6 for example shows excellent management regarding their relations with external stakeholders. However, there are differences between HEIs that have contacts with external stakeholders and HEIs that are in addition able to develop these contacts into contributing external stakeholders.

In this benchmark study the most frequently mentioned ways to disseminate entrepreneurship to society is by setting up an advice centre or visit schools to promote entrepreneurship and entrepreneurship education. Almost all HEIs in this benchmark have open entrepreneurial events for people other than students. The higher education institutes ERW2 and ERW6 distinguish themselves from the other HEIs by having a higher share of third flow of money, different types of external stakeholders who contribute to the program and a greater involvement of alumni in the program.

When looking at the results of the indicator HEI-industry collaboration it becomes clear that all higher education institutes are involved in more than one type of collaboration. The number of

types of collaboration varies from 5 types (ERW1) to 9 and 10 types (ERW2 and ERW6). The ERW4 and ERW5 have respectively 7 and 6 different types of collaboration. The four types of collaboration which make the difference are recruitment of graduates, spin-off creation, the creation of physical facilities and the licensing of Intellectual Property. Spin-off creation and licensing op IP require more intensive contact between the HEI and the industry partner and have a bigger influence on the knowledge transfer (i.e. bigger influence on the performance of the HEI) than the other types of collaboration (Ramos-Vielba and Fernández-Esquinas, 2011). The ERW2 and ERW6 are the only two HEIs which mention to have these types of collaborations with industry and therefore distinguish themselves from the other HEIs.

Also, when considering the motivation and need to collaborate with industry, differences between the HEIs are visible. The ERW2 and ERW6 mention the most possible options as possible motivations. They also show a broader need for collaboration than the other HEIs. Not only the practical experience of students matters, also the need for funds and state of the art research was mentioned by these two higher education institutes. Considering the mode of governance, there are no big differences between the HEIs. Almost all drivers were identified as applicable to all HEIs, this was not the case for the barriers. Some barriers were mentioned by only two HEIs and some barriers were not chosen at all (uncertainty). The ERW2 mentioned as only HEI that they consider transaction related barriers harder to overcome, the rest of the HEIs mentioned orientation related barriers. Not one of the higher education institutes does evaluate their collaborations with the industry in a regular or structural manner.

To conclude this section with, the first research question: *Which aspects of HEI-Industry linkages should be added to the Euregio Rhein-Waal entrepreneurship education benchmark to improve measurement of the dimension 'outreach'?* needs to be answered. Some of the aspects taken into account show differences between the higher education institutes, other aspects are answered approximately equal among the HEIs. Aspects which seem to make a difference are, looking at the good practice higher education institutes, the motivation and need to collaborate and the type of collaboration. More research is needed to validate this and to investigate whether having more different types of collaboration is a positive feature of collaboration or not. The HEIs score more or less the same when looking at the modes of governance, which could mean that this aspect does not has a real added value. Also the results related to the drivers for successful collaboration did not yielded very large differences between the HEIs, whereas the barriers did show some differences. In this stage, it is hard to draw clear cut conclusions regarding the additional questions. Only five higher education institutes were part of this part of the research and the results can only give an indication. What is clear is that these results do provide the opportunity of better

understanding how HEIs make use of the possibility to collaborate with industry and shows that there is room for improvement.

Development

The performance of entrepreneurship education programs is to some extent also reflected in the scores on the indicators of the dimension development. The higher education institutes that have a high performing entrepreneurship education program are also the institutes that score relatively well on the dimension development. The ERW6 is the exception in this case; it scores moderate on this dimension, even though it is the best overall performing HEI. Where the indicator user-driven improvement does not give major differences between higher education institutes, the evaluation of goals and investment in human resources do.

The good practices that have good scores on the dimension development score especially well on the share of students with an entrepreneurial mind-set through education. Therefore it is concluded and confirmed that proper evaluation procedures and investment in human resources benefits the performance of the entrepreneurship programs. Continuous evaluation of goals and strategies is essential for improving entrepreneurship education. Like the findings in the report by NIRAS et al. (2008), there is an overall tendency to focus on individual and user-driven improvement rather than an evaluation of goals and strategies.

In addition, the findings in this study show that investment in human resources is not a top priority of the higher education institutes examined in this benchmark study. The same findings are also reported in the publication by NIRAS et al. (2008). There are also a few or no teachers being trained to teach the new pedagogy which is assumed to be different from traditional teaching methods and therefore necessary for entrepreneurship education.

6.2 Overall recommendations

In this section recommendations are given regarding the overall performance of the higher education institutes taking part in this benchmark study. This means that the following recommendations apply to all the higher education institutes (to some more than others). In Appendix III all higher education institutes are taken individually by presenting their strengths and weaknesses and giving individual recommendations.

Strategy: Embeddedness

The importance of entrepreneurship for a HEI and the attention given to entrepreneurship is often reflected by the level of integration of entrepreneurship in the mission statements of the institution (Hoffmann et al, 2004; NIRAS et al., 2008). The participating higher education institutes in this benchmark study, with the exception of ERW1 and ERW3, could embed entrepreneurship more in

their organisation. The embeddedness of entrepreneurship in the strategy of the HEI can stimulate the development and assessment of the entrepreneurship education program. Furthermore, the integration of entrepreneurship in the mission statement and the strategic plans gives an indication of the importance of knowledge transfer for the HEI (NIRAS et al., 2008).

Strategy: High-level managers acting as champions of entrepreneurship education

The low number of high level managers acting as champions of entrepreneurship at almost all higher education institutes implies that there is room for improvement. The HEIs ERW3 and ERW2 have created large networks of which some high-level managers act upon their roles as champions of entrepreneurship. There are also other HEIs that have created a large network around their institutions. It is likely that there are high-level managers willing to take up their role as champions of entrepreneurship. These high-level managers can act as champions of entrepreneurship and subsequently try to draw attention from the university board with the aim of making entrepreneurship more central to the institution (NIRAS et al., 2008).

Resources: Self-generating income activities

According to NIRAS et al. (2008), the more a HEI is able to generate income of its own, the more entrepreneurship will become a permanent element of the education institute. It would be a positive development if certain activities of the entrepreneurship education program were to generate income which could be allocated to the further development of the entrepreneurship education program. The centres of entrepreneurship play an important role in generating income (Menzies, 1998) and gives the participating HEIs a window for improvement. Furthermore, self-generating activities reduce dependency on external funding.

Education: Action based teaching methods

One of the more practical and smaller improvements which can be made, is implementing more action based teaching methods. All higher education institutes show room for improvement in this field. Next to the content of the courses and its accessibility to students, the didactic methods are important for students to acquire an entrepreneurial mind-set (Lans & Gulikers, 2010). Traditional teaching methods are not applicable to entrepreneurship education (Potter, 2008). Therefore, an effective entrepreneurship education program provides a diversity of courses and degrees combined with high quality teaching methods. 'Learning by doing' - which is referred to as experiential learning - is more effective than traditional learning for entrepreneurship (NIRAS et al., 2008; Walter & Dohse, 2009). The presence of experimental teaching (Hoffman et al., 2004) promotes innovative behaviour, students' self-assessment and the development of an entrepreneurial spirit (Blenker et al., 2006). An example of implementing more experimental teaching methods is making use of guest lecturers.

Guest lecturers provide many benefits to the entrepreneurship education program. They are relatively inexpensive and they keep teaching up-to-date. Contacts between students and entrepreneurs contribute directly as well as indirectly to the success of entrepreneurship education (Brindley & Ritchie, 2000). The percentage of guest lecturers given in a course is rather low, with an average of less than 30%. This percentage can be increased. Direct relations can be realized when entrepreneurs act as guest lecturers in the education program. Listening to guest lecturers is one of the ways in which students can become acquainted with real-life entrepreneurship problemsExperiential learning is also enhanced by internships or similar placements (Kirby, 1998; Westhead et al., 2000) and projects with small firms (Hollingsworth et al., 1974; Sonfield, 1981; Chan and Anderson, 1994; Brindley and Ritchie, 2000).

Education: Limited entrepreneurship education in Master's degree

Few possibilities to study entrepreneurship degrees or certificates for Master students. Entrepreneurship education seems to be focused on bachelor students. This is surprising knowing that students often need to be acquainted and triggered by entrepreneurship before they attend minors or degrees in entrepreneurship. When students are triggered in their bachelor it can be interesting to offer entrepreneurship education in students' Masters for interested students. This of course only holds for the HEIs which actually offer a Master's degree.

A more general recommendation which belongs mostly to the dimension education is that it is not clear within institutions which courses can be considered as entrepreneurship courses. It should be clear which courses can be considered as one of the entrepreneurship courses. Also, once it is clear which courses deal with entrepreneurship in their content, these courses should be better embedded in the curriculum. In the current study there appears to be a focus on only business students following entrepreneurship courses. Another general recommendation therefore is to also look at the courses given to non-business students and involve them more in entrepreneurship education.

Outreach: Involvement of the external environment

In general, the HEIs should try to involve the different actors in their environment in the program. Some HEIs do not have many significant contacts with potential stakeholders, whereas others have contacts but stakeholders do not contribute to the entrepreneurship education program.

First of all, developing the entrepreneurial mind-set of students through practice needs opportunities to gain those experiences. Alumni and other stakeholders can play a vital role in offering these opportunities. Improving the involvement of alumni has more benefits than just more opportunities for entrepreneurial experience through practice. Alumni are beneficial to the

entrepreneurship education set-up because they confront students with real-life entrepreneurial problems and keep the program up-to-date with reality. Also, using alumni enables an institution to increase the scope of the teaching because lectures can be given by guest speakers which can be alumni and other stakeholders, while the costs of extra lectures can still be kept low. The contacts of students with private companies can also be stimulated when keeping alumni and stakeholders closer in touch and inviting them to contribute to the entrepreneurship education program. Moreover, alumni can help students whose entrepreneurial intentions are triggered.

Development: Investment in human resources

All the higher education institutes are recommended to encourage interest in entrepreneurship education by teachers and to give recognition for achievements by the entrepreneurship education teachers. Moreover, the percentage of teachers who are trained for entrepreneurship education is far too low (except the ERW1). Investment in human resources benefits the entrepreneurship education program because teachers can provide the necessary teaching methods. When looking at the overall satisfaction regarding funding for the old program and for new initiatives it seems that there are resources available that can be used for investment in human resources. However, another way to facilitate entrepreneurship education can be to appoint practitioners for the already fully developed entrepreneurship education courses. This is less costly compared to training teachers and is therefore an interesting option for entrepreneurship education programs facing cutbacks.

7. Discussion

In this section the results of the benchmark study are discussed. First the relation between the dimensions of entrepreneurship education and the performance indicators is discussed. This is followed by a discussion regarding HEI-industry collaboration. To conclude this study with some limitations of this study are presented.

'Mismatch' between dimension and performance

Some of the results on the different dimensions of entrepreneurship education do not match with the results of the report by NIRAS et al. (2008). Just like in this study, Blok et al. (2013) also encountered these problems with the dimensions strategy and resources. For instance, with regard to the dimension strategy, it can be concluded from the NIRAS et al. (2008) report that the adjustments of the mission statement and strategic plan of the university can be seen as important interventions to improve the entrepreneurship education program. The literature review made clear that the adjustment of missions and strategic plans can function as a guideline for implementing successful entrepreneurship education programs. Several aspects of entrepreneurship education can be included in the mission statement or strategy of the university, like the entrepreneurial identity of the university itself, the importance of enhancing the entrepreneurial attitude of students and staff, or the importance of knowledge transfer towards society, and so on. Nevertheless, the example of good practices ERW6 and ERW2 suggests that the implementation of entrepreneurship education is possible without its implementation at a strategic level. These results shows that there is a reason for possibly reconsidering how the dimensions strategy and resources influence the performance indicators and whether the measurement of the performance indicators is a good assessment of the performance of higher education institutes. This latter comment refers to the fact that the performance indicators are based on specific aspects of the dimensions of entrepreneurship education; there is a mutual dependency between the dimensions of entrepreneurship education and the performance indicators. The performance indicators are not exclusive and this could imply that the results are somewhat biased. Future research should investigate the weighing factors of certain indicators (especially the dimensions strategy and resources) related to the performance indicators.

Even though this benchmark study is not focused on ranking the higher education institutes, but on learning from each other, in measuring the performance some of the outcomes are still based on comparing the HEIs among each other and to some extent ranking them. Also the mutual dependency between the dimensions and the performance indicators could cause some problems in analysing and validating the results. This complicates the interpretation of the results and

recommendations for the participating higher education institutes. A possible alternative for evaluating and interpreting the results of the performance of the HEIs is using a so called INK-model, which focuses on providing tools for self-evaluation and improvement (Wesselink, 2010). The idea behind a model like this, is that it not just describes (or prescribes) what should be seen as entrepreneurship education by means of underpinning principles, but that such a model gives footholds to start working from a situation in which traditional education is dominant, towards a situation in which entrepreneurship education is dominant (Wesselink, 2010). By doing this a continuum can be drawn in which a higher education institute can be situated between for example four stages: 'traditional education', 'starting to implement entrepreneurship education', 'partial entrepreneurship education' and 'entrepreneurship education'. This could give the higher education institute the possibility to reassess their own position by making use of the benchmark results and can decide upon their level of ambition to become more entrepreneurial or not.

HEI-industry collaboration

Because of the fact that the questions regarding collaboration with industry were not asked face-to-face some of the answers are a bit blunt. Especially when looking at the answers given related to the drivers and barriers for successful collaboration. The open ended questions were quite short and not really insightful. This was expected, therefore the questionnaire also included a list of possible drivers and barriers. The results concerning the drivers indicated that all drivers are considered as applicable to almost each HEI. The risk of overestimating one's success could be the reason for the predominantly positive results. For future research it would be better to make sure the answer on the open ended question (take a successful collaboration in mind, what made this collaboration a success?) is elaborated on and that there is the possibility to ask further questions as a researcher. This is also applicable for the barriers of successful collaboration. The answers are more diffuse, which also might relate to social desirable answers as is the case with the drivers.

Furthermore, it is questionable whether the results on HEI-industry collaboration are suitable for reflecting them in the measurement of the performance of the higher education institutes. Literature on the different types of collaboration does mentions the differences in intensity and additional value to knowledge transfer and therefore could possibly be a good estimator. The results show that the good practice HEIs differentiate themselves from the other HEIs on this specific aspect of HEI-industry collaboration, which, in turn, can be seen as confirming the literature found in this study. This does not count for the other aspects mentioned within this indicator. The results are more descriptive in nature and provide more general insights in how HEI-industry collaborations are used at the participating HEIs. The results provide supporting information on for example the institutional or personal character of the type of collaboration. Up to now, there is no research

known (at least not to the researcher) that relates the different types of governance to, for example, the successfulness of a collaboration or the influence it might have on knowledge transfer. For this reason it is hard to say anything about the influence of the mode of governance on the performance of the HEI and therefore the additional value of adding these questions to the benchmark study.

Limitations of the study

Besides this, there are some other points which should be mentioned in this section. To start with, the data collection took place in two separate rounds. Two interviews took place approximately two years ago, for the benchmark study on entrepreneurship education programs performed by Blok et al. (2013) and four of the interviews were performed in the previous months of this year. In the meantime, things could have changed at ERW2 and ERW3 considering, for example, the offer of entrepreneurship courses, or number of peer reviewed studies. Even though the differences will not influence the overall performance tremendously, it could imply a significant difference on some of the dimensions of entrepreneurship education.

Secondly a note on the background of the participants should be made. It was aimed for that each higher education institute delivered a representative of the centre for entrepreneurship and a senior lecturer. The goal was to do two separate interviews in order to get more in-depth results and more reliable data. In practice, however, only three HEIs actually scheduled two separate meetings. All the other HEIs asked the researcher for a joint interview. In those interviews often one of the two persons did most of the talking, which could have resulted in a slightly distorted picture of the HEI. This could have something to do with the different roles in the organization the two persons have and the researcher did try to overcome this by actively asking questions directly to the person who was more in the background. The interviews which were held separately, sometimes resulted in conflicting answers. This is not really a bad thing, it helped the researcher to get a more precise overview. To deal with this discrepancy between the lecturer and the representative of the centre for entrepreneurship was solved by either mediating between the two answers or asking for more information.

Thirdly, the differences between the higher education institutes in orientation is another aspect which needs to be discussed in this section. Not only differences between universities and universities of applied sciences have an influence on the results, also the differences in orientation could have affect the results. The HEIs all have a different character, from a more agri-food background to a more technical background and also HEIs with a focus on health care or science are part of the sample. Some of these orientations imply that it might be more obvious that these HEIs have implemented more entrepreneurship courses, because it comes more natural to them. Comparing these six different higher education institutes should be done with caution, nevertheless

the individual results are useful.

Concluding, this benchmark study is executed at a more or less basic level, the desk study on university-industry linkages proves that when zooming in on a particular dimension, one can find a lot more possible indicators than are mentioned so far in this benchmark study. There is a lot more research done on specific elements of the dimensions of entrepreneurship education. On the one hand, this offers room for further enhancement of the benchmark method used in this study, but is also implies that there are possible limits to this study. The currently used dimensions and supporting indicators should be critically assessed on their usability and be up to date when using in future research.

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Appendix

I: Construct, operationalization and measurement

Table I: Construct, operationalization and measurement

Constructs	Operationalization of constructs	Measurement
Strategy	**Goals** • Embeddedness of mission statement • Embeddedness of strategic plan **Policies** • Departments with own policies • Clear institutional policy/action plans • Policy to attract employees from business **Embeddedness** • Placement of primary strategic responsibility • Number of high level managers	➢ 5 points scale by doing content analysis for both questions ➢ In percentage of all departments ➢ Semantic differential (SD) scale from totally agree till totally disagree for both questions ➢ 7 point ladder with principal/ rector/ provost highest and none lowest ➢ measured as ratio variable
Resources	**Allocation** • Support with funding • Available budget for new entrepreneurship initiatives • Share of budget for entrepreneurship activities **Type/sources** • What sources of budget and what share • How long are the sources available **Self-generated income** • What income generating activities	➢ SD from very insufficient till very sufficient ➢ SD from totally disagree till totally agree ➢ calculated from annual financial plan in percentages ➢ Options indicated percentages in ratio ➢ in years ➢ six options offered
Institutional infrastructure	**Approaches** • Presence of a chair group • External or internal centre of entrepreneurship • Availability of incubator facilities • Presence of Technology Transfer Office • Meeting room for entrepreneurship students **Research** • Number of peer reviewed studies on entrepreneurship • Number of entrepreneurship chairs/professorships **Level of cross disciplines** • Teachers from multiple disciplines • Students from multiple disciplines • Courses developed by cooperation of multiple chair groups	➢ Yes/no ➢ Internal/external ➢ Yes/no ➢ Yes/no ➢ Yes/no ➢ Ratio ➢ Amount in Full Time Employees ➢ Average number of disciplines per course ➢ Average number of disciplines per course ➢ number of courses
Education	**Scope** • What type of education forms are offered • Average number of attendants for entrepreneurship courses • Average number of ECTS • Number of entrepreneurship courses • Attendants of executive education/ management training • Share of compulsory in-curricular entrepreneurship courses in Bachelor • Share of compulsory in-curricular entrepreneurship courses in Master **Set- up** • Teaching method • Authenticity • Guest speakers • ECTS for internship or similar experience part of entrepreneurship education	➢ 7 options offered ➢ continue variable ➢ continuous variable ➢ continuous variable ➢ continuous variable ➢ Percentage ➢ Percentage ➢ SD from traditional to experimental + content analysis course manuals ➢ 5points scale totally disagree to totally agree + content analysis course manuals ➢ percentage of courses

	• Contacts with private company	➢ number of ECTS ➢ number of times in contact
Outreach	**External stakeholders** • What links and how do they contribute • Students participating in external entrepreneurship events **Community engagement** • Attendants of vocational guidance/mentor schemes • Third flow of funding • Patents • Availability of advice centre • Support of entrepreneurship in schools • Entrepreneurial events open for everyone • Training for entrepreneurs and companies • Support entrepreneurship international **Alumni** • Reasons for keeping track of alumni • Number of alumni involved in entrepreneurship program **University-industry collaboration** • Motivation and need • Informal/formal and institutional/personal •	➢ options offered ➢ amount of students ➢ number of attendants ➢ percentage of income ➢ number of patents over last 3 years ➢ yes/no ➢ yes/no ➢ yes/no ➢ yes/no ➢ yes/no ➢ options offered ➢ amount of alumni ➢ Options offered and open question ➢ Options offered
Development	**User driven improvement** • Methods used to evaluate entrepreneurship courses **Evaluation** • Evaluation of effect entrepreneurship education on students' career • Examination of needs of stakeholders • Procedure for following up on institution's goals and policies **Human resources** • Encouragement of teachers with entrepreneurship education initiatives • Recognition for staff involved in entrepreneurship education • Teachers engaged in training for improving their entrepreneurship education skills	➢ methods offered ➢ how often informal and formal in years ➢ how often informal and formal in years ➢ how often informal and formal in years ➢ Options offered ➢ Options offered ➢ Percentage of teachers engaged in training
Performance	**entrepreneurial students through learning** **knowledge transfer** **entrepreneurial students through practice**	➢ Decided based on rankings and controlled for by gathered data

II : Code scheme

Performance

Entrepreneurial students through education

The share of entrepreneurial students through education is measured in the following way:

1. The total number of entrepreneurship education attendants = the average number of students enrolled for one entrepreneurship course multiplied by the number of entrepreneurship courses.
2. The share of the entrepreneurship education attendants = total number of entrepreneurship education attendants divided by the total number of students at the HEI.
3. Finally this is multiplied by the average number of ECTS for an entrepreneurship course to get the total number of hours in entrepreneurship education compensated by the size of the HEI.

4. The final score on this indicator is calculated by translating the result after step three into a five-point parametric scale where 1= the lowest number by a HEI in step three and 5= the highest number by a HEI.

Knowledge transfer

- The percentage of third flow of funding is calculated from the annual financial plan.
- The number of peer-reviewed studies in ISI journals is calculated from Web of Science.
- The number of patents is determined by accessing the World International Patenting Organisation database

The scores on each aspect are translated into a five-point parametric scale where 1= the lowest number by a HEI in step three and 5= the highest number by a HEI. The average score is taken from the three aspects measuring the indicator knowledge transfer.

Entrepreneurial students through practical experience

The number of entrepreneurship students at each institution which participate in entrepreneurship events/projects or business plan competitions outside our institution was gathered by answers from respondents. The scores on each aspect are translated into a five-point parametric scale where 1= the lowest number by a HEI in step three and 5= the highest number by a HEI.

The number of people attending the executive education/management training was gathered by answers from respondents. The scores on each aspect are translated into a five-point parametric scale where 1= the lowest number by a HEI in step three and 5= the highest number by a HEI.

Strategy

- 1= absence of entrepreneurship or commercialization and valorisation
- 2= implicit communication of entrepreneurship and/or commercialization and valorisation of knowledge
- 3= explicit presence of importance of entrepreneurship in the mission
- 4= explicit communication of entrepreneurship and more detailed communication of valorisation of research, and services
- 5= explicit communication of entrepreneurial actions of the university as a whole, in the field of education, through a market oriented education and expertise.

The more topics are represented in the strategic plan, the higher the score on this indicator. The average score is taken from the questions regarding the HEI mission and strategic plan. This average score represents the score on the indicator Goals. This is one of the three indicators that measure the framework condition strategy. The final score on the framework condition strategy is the average score on the three indicators.

Operationalization of the indicator policy

- The scores on the percentage of departments with their own entrepreneurship policy plans are the following: 1= 0% - 20%, 2= 21% - 40%, 3= 41% - 60%, 4= 61% - 80% and 5= 81% - 100%.
- The level of agreement with the statement: Our institution has clearly written entrepreneurship education policy plans is scored by a five point semantic differential scale reaching from 1= totally disagree to 5 = totally agree
- The level of agreement with the statement: Our institution has a policy to attract/recruit employees which are active in business is scored by a five point semantic differential scale reaching from 1= totally disagree to 5 = totally agree

The average score is taken from the three questions measuring the indicator policies. This is one of the three indicators that measure the framework condition strategy. The average score of the indicator policies has an equal weight as the two other indicators: Goals and Embeddedness.

Operationalization of the indicator embeddedness

- The question: Where is the placement of the primary strategic responsibility for entrepreneurship education program at your institution, is scored with: 1= lecture, 2= professor, 3= Dean, 4= Pro-vice chancellor, 5= Principal, Rector, Provost.
- The answers to the question: How many high-level mangers act as champions of entrepreneurship education and contribute to the development of the educational program, is translated into a five-point parametric scale where 1= the lowest given answer and 5= the highest given answer.

The average score is taken from the two questions measuring the indicator Embeddedness. This is one of the three indicators that measure the framework condition strategy. The average score of the indicator embeddedness has equal weight as the two other indicators: Goals and Embeddedness.

Resources

Operationalization of the indicator allocation

The level of agreement with the following two statements:

- In the previous academic year , the institution support for the entrepreneurship education program was
- There is superfluous budget available which stimulates new entrepreneurship related educational initiatives

The average score is taken from the two questions measuring the indicator allocation. This is one of the three indicators that measure the framework condition Resources. The final score on the

framework condition resources is the average score on the three indicators: allocation, type of sources and self-generating income activities.

Operationalization of type of sources

- The score on the indicator type of sources is measured by the number of sources which can be five in total. Therefore the number of sources can reach from 1 to 5.
- The share of the income source times the length of availability to the program gives a number that indicates the income security. This number is translated into a five-point parametric scale with 1= the lowest number indicating income security and 5= the highest number indicating income security.

The average score is taken from the two questions measuring the indicator type of sources. This is one of the three indicators that measure the framework condition resources. The final score on the framework condition resources is the average score on the three indicators: allocation, type of sources and self-generating income activities.

Operationalization of self-generating activities

What activities which generate income does your institution have? The score on this indicator is the following: 1= none, 2= 1 type of self-generating income activities, 3= 2 types, and so on .

There is one question measuring the indicator self-generating income activities. This is one of the three indicators that measure the framework condition Resources. The final score on the framework condition resources is the average score on the three indicators: allocation, type of sources and self-generating income activities.

Institutional infrastructure

Operationalization of the indicator approaches

There are five questions asked regarding the indicator approaches. The questions that are answered positively yielded 1 point. Therefore the total score when all facilities were offered resulted in a score of 5. The score is taken from the five questions measuring the indicator approaches. This is one of the three indicators that measure the framework condition institutional infrastructures. The final score on the framework condition institutional infrastructures is the average score on the three indicators: approaches, research and cross-disciplinary structures.

Operationalization of research

- There is a five-point parametric scale ranging from the lowest number of peer-reviewed studies with a score of 1 to the highest number of peer-reviewed studies that received a score of five.

- The same procedure is used for the number of FTE in professorships/chairs.

The average score is taken from the two questions measuring the indicator Research. This is one of the three indicators that measure the framework condition institutional infrastructures. The final score on the framework condition institutional infrastructures is the average score on the three indicators: approaches, research and cross-disciplinary structures.

Operationalization of cross-disciplinary structures

The three questions measuring the indicator cross-disciplinary structures were open questions that yielded absolute numbers. The scores were translated into five-point parametric scales where for each question separately the lowest given answer was scored with 1 and the highest given answer yielded a score of 5. This was done for all three questions measuring the indicator cross-disciplinary structures.

The average score is taken from the three questions measuring the indicator cross-disciplinary structures. This is one of the three indicators that measure the framework condition institutional infrastructures. The final score on the framework condition institutional infrastructures is the average score on the three indicators: approaches, research and cross-disciplinary structures.

Education

Operationalization of education scope

- The first question measures the number of different types of entrepreneurship education. The score on this indicator represents the number of different types of education. Therefore a score 1 implies one type of entrepreneurship education, 2 implies two types of entrepreneurship education (e.g. entrepreneurship courses and PhD), and so on.
- The student volume is measured by three questions that are mentioned above. The answers are used to calculate the student volume. The scores on student volume are translated into a five-point parametric scale where 1= the lowest student volume number and 5= the highest student volume number.

The average score is taken from the three questions measuring the indicator Education Scope. This is one of the three indicators that measure the framework condition Education. The final score on the framework condition Education is the average score on the two indicators: Education Scope and Education Set-up.

Operationalization of education set-up

The answers were translated into a five-point parametric scale where 1= the lowest percentage of experiential learning and 5= the highest percentage of experiential learning.

Furthermore a statement is presented to the effect that that the personality of students is

developed by confronting them with real-life entrepreneurship problems. This question was measured on a five-point scale where 1= totally disagree and 5 = totally agree.

To measure the presence of guest lecturers, respondents were asked what percentage of all lectures in entrepreneurship course is given by guest speakers. The answers were translated into a five-point parametric scale where 1= the lowest percentage of guest lectures and 5= the highest percentage of guest lectures.

For both open questions the answers were translated into a five-point parametric scale where for the first question: 1= the lowest number of ECTS/semester credits and 5= the largest number of ECTS/semester credits. For the second question: 1= the lowest number of contacts with private companies and 5= the highest number of contacts with private companies.

The average score is taken from the five questions measuring the indicator Education Set-up. This is one of the three indicators that measure the framework condition Education. The final score on the framework condition Education is the average score on the three indicators: Education Scope and Education Set-up.

Outreach

Operationalization of links with external stakeholders

The links with external stakeholders is measured by the question: What links does your institution have with external stakeholders of your entrepreneurship education program and do they contribute to the entrepreneurship education program? The respondents were able to indicate just contacts, or whether they actually contribute. Contribution was split into financial or other means of contributing to the program.

The HEIs received points for every contact they have with each stakeholder and they received two points if these stakeholders also contribute to the program. Subsequently the total number of points was calculated. These total numbers of points were translated into a five-point parametric scale with 1= the lowest total points and 5= the highest total points.

The respondents needed to indicate whether there are: never (score =1), now and then (score= 2), regularly (score= 3), often (score= 4) or continuously (score= 5), students at the HEI that participate in entrepreneurship events outside the institution.

The average score is taken from the two questions measuring the indicator External Contacts. This is one of the three indicators that measure the framework condition Outreach. The final score on the framework condition Outreach is the average score on the three indicators: External Contacts, Community Engagement and Alumni.

Operationalization of the indicator community engagement

The answers were translated into a five-point parametric scale where 1= the lowest number of executive education attendants and 5= the largest number of executive education attendants.

The percentages of third flow of funding were translated into a five-point parametric scale where 1= the lowest percentage of third flow of funding and 5= the highest percentage of third flow of funding.

The number of patents was translated into a five-point parametric scale where 1= the lowest number of patents and 5= the highest number of patents.

For each of these five aspects, the HEI receives a point. Therefore the scores on these questions can range between 0 and 5.

The average score is taken from the four questions measuring the indicator Community Engagement. This is one of the three indicators that measure the framework condition Outreach. The final score on the framework condition Outreach is the average score on the three indicators: External Contacts, Community Engagement and Alumni.

Operationalization of the indicator alumni

The reasons why HEIs keep track of alumni are five in total. Therefore the scores can range from 0-5.

The question how many alumni are involved in the program is an open question. The answers were translated into a five-point parametric scale where 1= the lowest number of alumni involved in the program and 5= the highest number of alumni involved in the program.

The average score is taken from the two questions measuring the indicator Alumni. This is one of the three indicators that measure the framework condition Outreach. The final score on the framework condition Outreach is the average score on the three indicators: External Contacts, Community Engagement and Alumni.

Development

Operationalization of the indicator user-driven improvement

Every option used by the HEI yields 1 point. This implies that if all options are used the HEI receives a score of 5.

The score on the indicator User-driven improvement concerns(?) the number of different user-driven improvement methods used by the HEI. This is one of the three indicators that measure the framework condition Development. The final score on the framework condition Development is the average score on the three indicators: User-driven improvement, Evaluation of goals and Investment in human resources.

Operationalization of the indicator investment in human resources

- Every option indicated by the HEI yields 1 point. This implies that the scores can reach from 0 to 5.

- If the HEI indicated none it received a score of 0 and if it indicated all options it received a score of 5.
- The ratios were translated into a five-point parametric scale where 1= the lowest ratio and 5= the highest ratio.

The average score is taken from the three questions measuring the indicator user-driven improvement. This is one of the three indicators that measure the framework condition Development. The final score on the framework condition Development is the average score on the three indicators: User-driven improvement, Evaluation of goals and Investment in human resources.

III: Individual recommendations

In the following section each higher education institute is covered individually. First we will present the strengths and weaknesses of the higher education institute in an overview. Then we will elaborate on some of the strengths of the HEI. Finally we will consider those points which in our view could be improved in order to improve the performance.

ERW1

The ERW1 is the best performing university of applied sciences and scores well on the dimensions strategy and education. Especially when looking at the dimension strategy, other HEIs could and should learn from the ERW1. Due to their nature of being a more practice oriented university, the ERW1 scores well on the performance indicator entrepreneurial students through practice, but shows room for improvement when it comes to, for example, knowledge transfer. Considering these type of improvements, the ERW1 could learn from the other two good practice examples.

Table II. Strengths and weaknesses ERW1

Strengths	Weaknesses
Central place of entrepreneurship in the mission and strategic plan supported by situating primary strategic responsibility at highest management level	Relatively low number of peer-reviewed articles, considering the presence of a lecture ship in entrepreneurship
Policy to attract employees from business	The involvement of alumni in the entrepreneurship education program is quite low
Sufficient and well-organised portfolio of sources of income	There is no special policy to invest in human resources for entrepreneurship education
High community involvement	
Action based teaching methods with a focus on practical entrepreneurial experiences	
Many links with different stakeholders	

Strategy

The embeddedness of entrepreneurship in the strategy of the HEI can stimulate the development and assessment of the entrepreneurship education program. Furthermore, the integration of entrepreneurship in the mission statement and the strategic plans gives an indication of the importance of knowledge transfer for the HEI (NIRAS et al., 2008). The ERW1 shows that entrepreneurship is central in their mission statement and the strategic plan of the HEI. Moreover, the primary strategic responsibility is situated at the highest management level of the institution.

One of the other strengths of ERW1 with regard to the dimension strategy is their clear policies to attract employees from the business world. The ERW1 really serves as a good example of how to embed entrepreneurship in the strategy of the HEI.

Institutional infrastructure

Pittaway and Cope (2007) state that institutional infrastructure is one of the factors which determine the success of implementing entrepreneurship education. Institutional infrastructure indirectly and directly affects entrepreneurship education (Poole & Robertson, 2003). There are three indicators which measure this framework condition: the availability of physical structures, the presence of entrepreneurship research and the level of cross-disciplinary structures. The ERW1 scores moderate on this dimension. The HEI has no peer-reviewed studies in ISI journals. Even though the focus of universities of applied sciences is more on education than research, the ERW1, with their lectors in entrepreneurship, has the potential to make more use of their potential to publish more entrepreneurship related studies. Research focused on entrepreneurship has a direct effect on the quality of entrepreneurship education and therefore is a possibility for the ERW1 to improve their entrepreneurship education program.

Outreach

Outreach activities are important because they offer students the opportunity to gain practical experience with entrepreneurship and, ultimately, to develop an entrepreneurial mind-set. Outreach activities are especially important for university students, because otherwise they might become more isolated from the business world (NIRAS et al., 2008). Alumni and other stakeholders can play a vital role in offering students these practical experiences. When looking at the score of ERW1 on the indicator alumni, it can be concluded that there is room for improvement. There are already contacts with all different types of stakeholders, but the ERW1 does not keep track of the careers of their alumni and do not involve them in the education program as some other HEIs do. There is a potential for the ERW1 to engage more with their alumni and make it more transparent which alumni could play a role in their education program. Their community involvement on the other hand is quite high.

By making their knowledge and expertise in the field of entrepreneurship available to entrepreneurs and private companies in the region, the ERW1 serves as an example to other HEIs, considering the indicator community involvement.

Development

Entrepreneurship education should adapt to the ever changing needs and wants of the users of the education program and the stakeholders involved in the program. By continuously trying to improve the program, it can satisfy the actors which are involved (NIRAS et al., 2008). This dimension refers to the effort to effectuate continuous improvement of entrepreneurship at the HEI. The dimension development is measured by three indicators which are subsequently: user-driven improvement, evaluation of goals, and investment in human resources. The higher education institute ERW1 shows good management of the different types of evaluations. However, there is a lack of investment in human resources. If ERW1 wants to have lecturers that are trained to teach the didactics needed for entrepreneurship, they should first of all use more means and different ways of encouraging teachers to become engaged in entrepreneurship education.

ERW2

The ERW2 is among the good practice examples of this benchmark study. This is mainly due to it being the type of institute that focuses on knowledge transfer through commercialization and valorisation. However, when looking at the share of students that develop an entrepreneurial mind-set through education some improvements seem to be desirable. Therefore, the ERW2 can learn from activities carried out by the other good practice examples to improve the development of an entrepreneurial mind-set through education and practical experiences.

Table III. Strengths and weaknesses ERW2

Strengths	Weaknesses
Faculties have their own entrepreneurship plans	Relatively low embeddedness of entrepreneurship in the overall university
Relatively many high-level managers acting as champions of entrepreneurship	Practical entrepreneurial experience does not have a priority when hiring new employees
Relatively many peer-reviewed studies for a university with no chair group and 0.2 FTE professors	Few student contacts with private companies
Many resources available for the current program and new initiatives	Relatively limited investment in human resources
Many links with different stakeholders	
Good management of alumni	
High entrepreneurial involvement in its environment	
Good evaluation methods	

Strategy

The embeddedness of entrepreneurship in the strategy of the HEI can stimulate the development and assessment of the entrepreneurship education program. Furthermore, the integration of entrepreneurship in the mission statement and the strategic plan gives an indication of the importance of knowledge transfer for the HEI (NIRAS et al., 2008). Instead of communicating entrepreneurial intentions through the mission statement and strategic plan, the HEI ERW2 embeds entrepreneurship in the institution by engaging in the following activities. First of all, it uses high-level managers acting as champions of entrepreneurship to embed entrepreneurship in the institution. Secondly, the faculties are autonomous in their entrepreneurship practices because every faculty has its own entrepreneurship plans.

However, there are also some points that need improvement. There is a potential to embed entrepreneurship more into the strategy of the ERW2. First of all, entrepreneurship could receive a more central place in the mission statement or strategic plan of the university. Secondly, primary strategic responsibility is at professorial level, which is relatively low in the hierarchy of the HEI. Support from higher positions in the institution could positively affect the embeddedness of entrepreneurship at the lower levels of the HEI (NIRAS et al., 2008).

Institutional infrastructure

Pittaway and Cope (2007) state that institutional infrastructure is one of the factors which determine the success of implementing entrepreneurship education. Institutional infrastructure indirectly and directly affects entrepreneurship education (Poole & Robertson, 2003). There are three indicators which measure this framework condition: the availability of physical structures (approaches), the presence of entrepreneurship research and the level of cross-disciplinary structures. The ERW2 published many peer-reviewed studies, especially when considering that there is no full-time professor dedicated to entrepreneurship. Therefore this HEI serves as a good practice when it comes to research and knowledge transfer. Another indicator is the cross-disciplinary structures involved in entrepreneurship education. The cooperation between chair groups is managed properly at the ERW2 which manifests itself in the number of courses created by collaboration of multiple chair groups. However, findings indicate that the number of different departments with students that attend entrepreneurship education at ERW2 is relatively low. If entrepreneurship education is really important university wide, then entrepreneurship should be more embedded in courses not directly linked to entrepreneurship. This can increase the interest of students who are not already acquainted with entrepreneurship. Subsequently, these students may well be persuaded to attend

courses of which entrepreneurship is the main subject later on in their study program. Ultimately this can lead to an increase in the number of disciplines reached by entrepreneurship education.

Education

The dimension education concerns all educational activities of the entrepreneurship education program. The larger the number of courses and degrees offered in entrepreneurship education, the more students can be educated to develop an entrepreneurial mind-set. Besides the content of the courses and its accessibility to students, the didactic methods are important for students to acquire an entrepreneurial mind-set (Lans & Gulikers, 2010). Like almost every other HEI the ERW2 offers the three most common types of education. Individual courses can be attended, a B.Sc. minor is offered and a PhD in entrepreneurship. There are education institutes in the sample that manage to reach a larger share of students than ERW2. This might imply that there is room for the ERW2 to reach more students as well. The students that become interested in entrepreneurship in their bachelor stage are faced with the limited offer of entrepreneurship education aimed at master students. Therefore offering more entrepreneurship education to students in their masters can be beneficial and will favourably distinguish ERW2 from other HEIs.

The ERW2 is an average scoring university regarding the level of experimental and real-life entrepreneurial learning. However, the number of contacts with private companies by students is relatively low and can be improved. This will benefit the entrepreneurial mind-set of students through practice. The HEI has many contacts with stakeholders and alumni. Therefore it is likely that there are various opportunities for improvement considering the number of students who get in contact with companies.

Development

Entrepreneurship education should adapt to the ever changing needs and wants of the users of the education program and the stakeholders involved in the program. By continuously trying to improve the program, it can satisfy the actors which are involved (NIRAS et al., 2008). This dimension refers to the effort to effectuate continuous improvement of entrepreneurship at the HEI. The dimension development is measured by three indicators which are subsequently: user-driven improvement, evaluation of goals, and investment in human resources. The HEI ERW2 has one of the highest scores on the indicators user-driven improvement and evaluation of goals. Moreover, teachers are encouraged to engage in entrepreneurship education by offering them incentives such as the award for new entrepreneurial initiatives. However, teachers are not specifically trained for entrepreneurship education. Investment in human resources may benefit the entrepreneurship education program because teachers are stimulated and trained to teach in entrepreneurship education and can provide the necessary teaching methods. Another way is to appoint practitioners

to teach the already fully developed entrepreneurship education courses, even though this is complicated by the tenure track system that exists at the ERW2.

ERW3

The ERW3 scores moderate on all dimensions. The only dimension in which they stand out from most of the other HEIs is the dimension strategy. The ERW3 has really embedded entrepreneurship in their strategy.

Table IV. Strengths and weaknesses ERW3

Strengths	Weaknesses
Faculties have their own entrepreneurship plans	The involvement of alumni in the entrepreneurship education program is quite low
Entrepreneurship is embedded in the strategy	Practical entrepreneurial experience does not have a priority when hiring new employees
Relatively many peer-reviewed studies	Few student contacts with private companies
Many resources available for the current program and new initiatives	Relatively limited investment in human resources
Many links with different stakeholders	Evaluation methods mostly informal
High entrepreneurial involvement in its environment	

Outreach

Outreach activities are important because they offer students the opportunity to gain practical experience with entrepreneurship and, ultimately, to develop an entrepreneurial mind-set. Outreach activities are especially important for university students, because otherwise they might become more isolated from the business world (NIRAS et al., 2008). Alumni and other stakeholders can play a vital role in offering students these practical experiences. Although the ERW3 scores quite well on percentage of guest lectures, there is still room for improvement. Having closer contacts with external stakeholders can play a role in this process, and they also contribute to the program (e.g. by providing guest lecturers). Confronting students with guest lecturers is one of the ways students can be confronted with real-life entrepreneurship. Another opportunity to confront students with real-life entrepreneurial problems is for example allowing students to interview actual entrepreneurs. This can be even more intensive and can have more practice components than a guest lecture.

Development

Entrepreneurship education should adapt to the ever changing needs and wants of the users of the education program and the stakeholders involved in the program. By continuously trying to improve the program, it can satisfy the actors which are involved (NIRAS et al., 2008). This dimension refers to the effort to effectuate continuous improvement of entrepreneurship at the HEI. The dimension

development is measured by three indicators which are subsequently: user-driven improvement, evaluation of goals, and investment in human resources. The higher education institute ERW3 shows room for improvement when looking at the management of evaluations and user-driven improvement. The ERW3 could learn from the good practices, since they evaluate the student's careers, goals and stakeholder needs in a formal way and on a more regular basis. Besides, there is room for improvement when looking at the investment in human resources. If ERW3 wants to have lecturers that are trained to teach the didactics needed for entrepreneurship, they could, for example, use more means and different ways of encouraging teachers to become engaged in entrepreneurship education. There is also room for improvement when considering the recognition of the achievements by teachers engaged in entrepreneurship. Finally measures should be taken to ensure that teachers receive training for facilitating entrepreneurship education.

Strategy

The embeddedness of entrepreneurship in the strategy of the HEI can stimulate the development and assessment of the entrepreneurship education program. Furthermore, the integration of entrepreneurship in the mission statement and the strategic plans gives an indication of the importance of knowledge transfer for the HEI (NIRAS et al., 2008). The ERW3 shows that entrepreneurship is central in their mission statement and the strategic plan of the HEI. The primary strategic responsibility is not situated at the highest management level of the institution. One of the other improvements of ERW3 with regard to the dimension strategy is that they do not have clear policies to attract employees from the business world. Even though the ERW3 has really embedded entrepreneurship in their mission statement and strategy plan, they could improve with respect to attracting employees from the business environment and placing the primary responsibility at the level of the provost/rector.

ERW4

The ERW4 is a HEI which is not among the best practices in this benchmark study. The ERW4 does not have a high score on any of the performance indicators: knowledge transfer, entrepreneurial students through education and entrepreneurial students through practice. ERW4 has mediocre scores on all the dimensions. Therefore ERW4 can learn considerably from the activities carried out by the good practice HEIs in this study.

Table V. Strengths and weaknesses ERW4

Strengths	Weaknesses
Presence of a professor and an entrepreneurship department	Little attention paid to entrepreneurship and knowledge valorisation in mission statement and strategic plan
Many different studies and different teachers involved in entrepreneurship education	No special attention given to the involvement of entrepreneurship in the community
Relatively high number of guest lecturers	There is alumni management but the potential is not fully used yet for the entrepreneurship education program
Action based teaching methods with a focus on practical entrepreneurial experiences	Investment in human resources receives little attention

Strategy

The embeddedness of entrepreneurship in the strategy of the HEI can stimulate the development and assessment of the entrepreneurship education program. Furthermore, the integration of entrepreneurship in the mission statement and the strategic plans gives an indication of the importance of knowledge transfer for the HEI (NIRAS et al., 2008). The HEI ERW4 scores relatively low on this dimension, especially with regard to written documents for entrepreneurship. If the ERW4 wants to incorporate entrepreneurship education more, then the first thing to improve is the communication of entrepreneurship by means of embedding entrepreneurship through the education institute. This can be realized by giving entrepreneurship and commercialization and valorisation of knowledge a more central place in the mission statement and the strategic plan. Subsequently one should develop clear entrepreneurship education policy/action plans. When setting goals and strategies specifically for entrepreneurship education and communicating them, people can become more motivated and become more involved in working together to embed entrepreneurship in the organization. Another aspect for improvement could be trying to increase the number of high-level managers as they can act as champions of entrepreneurship education within the institute.

Education

The dimension education concerns all educational activities of the entrepreneurship education program. The larger the number of courses and degrees offered in entrepreneurship education, the more students can be educated to develop an entrepreneurial mind-set. Besides the content of the courses and its accessibility to students, the didactic methods are important for students to acquire an entrepreneurial mind-set (Lans & Gulikers, 2010). The indicator education set-up is well managed by the ERW4. However, regarding education scope there is room for improvement. In absolute numbers there are relatively many students attending entrepreneurship education, but in relation to the total number of students, their number is quite low. This can be due to the fact that the number

of courses offered is rather low. Therefore the first recommendation is to offer different types of entrepreneurship education. The ERW4 could focus on increasing the scale of entrepreneurship education to get more students involved in entrepreneurship education. Also students from departments which are not directly associated with entrepreneurship can become involved in entrepreneurship education by offering more types of entrepreneurship courses.

Outreach

Outreach activities are important because they offer students the opportunity to gain practical experience with entrepreneurship and, ultimately, to develop an entrepreneurial mind-set. Outreach activities are especially important for university students, because otherwise they might become more isolated from the business world (NIRAS et al., 2008). Alumni and other stakeholders can play a vital role in offering students these practical experiences. The ERW4 has many links with external stakeholders who also contribute to the entrepreneurship education program. However, their involvement in the community regarding the distribution of entrepreneurship is relatively low. The ERW4 does offer advisory services in an advice centre. This can stimulate the exchange of knowledge, expertise and ideas between entrepreneurs and the HEI which is beneficial to both actors. However, there are more activities that can help this HEI to become more involved in the community and increase its knowledge transfer. In order to improve, the ERW4 could promote and inform about entrepreneurship in schools like other good practices do. The offering of advisory services can be supported with training courses for entrepreneurs. All together these measures can improve ties with entrepreneurs in the community that in turn can bring authentic entrepreneurship to the HEI for guest lecturers or coaching of students.

Development

Entrepreneurship education should adapt to the ever changing needs and wants of the users of the education program and the stakeholders involved in the program. By continuously trying to improve the program, it can satisfy the actors which are involved (NIRAS et al., 2008). This dimension refers to the effort to effectuate continuous improvement of entrepreneurship at the HEI. The dimension development is measured by three indicators which are subsequently: user-driven improvement, evaluation of goals, and investment in human resources. The ERW4 makes use of self-evaluation by teachers. Also students evaluate the entrepreneurship education. However, there are still opportunities to further improve this dimension. Improvement of the entrepreneurship education starts with improving the dimension strategy as mentioned before. When an HEI has clear goals and strategies, it is also easier to evaluate whether these goals and strategies are being reached. Besides these goals and strategies, it is important to evaluate the effect of entrepreneurship education on

students' careers and whether the needs of the stakeholders of the program are met. The ERW4 can improve formal evaluation of goals and strategies by arranging meetings with several groups within their organization to discuss the goals and strategy on a regular basis.

ERW5

The ERW5 is a special case in this benchmark study. Due to their short period of existence (< 4 years), many things are less developed at this HEI than at the other HEIs in this study. Mainly due to this reason, the ERW5 scores low on all the dimensions and therefore shows a very high potential for improvement. One of the main plus points of ERW5 is that they already have a relatively large group of students which they reach with entrepreneurship education. Every faculty has (at least) one entrepreneurship course in which students can enrol.

Table VI. Strengths and weaknesses ERW5

Strengths	Weaknesses
Policy to attract people from the business environment	No attention paid to entrepreneurship and knowledge valorisation in mission statement and strategic plan
Many different studies involved in entrepreneurship education	Relatively few facilities offered
Action based teaching methods with a focus on practical entrepreneurial experiences	Few types of resource sources
	Only individual courses on entrepreneurship offered
	No special attention given to the involvement of entrepreneurship in the community
	Lack of evaluation methods
	Investment in human resources receives little attention

Strategy

The embeddedness of entrepreneurship in the strategy of the HEI can stimulate the development and assessment of the entrepreneurship education program. Furthermore, the integration of entrepreneurship in the mission statement and the strategic plans gives an indication of the importance of knowledge transfer for the HEI (NIRAS et al., 2008). If the ERW5 would like to become more entrepreneurial attention could be paid to entrepreneurship or knowledge valorisation in their to develop mission statement and strategic plan. All faculties seem to have an idea about embedding entrepreneurship in their education program, but there is no overall policy. However, if this HEI considers entrepreneurship really important they could improve some aspects regarding the dimension strategy. They could consider embedding entrepreneurship (education) in their mission statement and their strategic plan.

Another possibility is having more high-level managers acting as champions of

entrepreneurship. Champions of entrepreneurship can play a crucial role in showing the importance of entrepreneurship education, which in turn is beneficial to the embeddedness of entrepreneurship education throughout the institution. The HEIs can make use of the knowledge and experience of these champions in the development of their education program.

Resources

Good budget allocation should ensure that there is a sufficient amount of money available for investments in the entrepreneurship education program. If a HEI wants to develop and maintain an entrepreneurship education program, it is important to have sufficient funding (Wilson, 2008 in Potter, 2008; NIRAS et al., 2008). Entrepreneurship education programs which have a bigger budget can invest in better facilities, offer more activities, train employees, etcetera. Therefore the assumption is that the better the support in terms of funding, the better the performance of the program will be. The ERW5 scores relatively low on this dimension and shows room for improvement in broadening their sources of income and the durability of the funding.

Education

The dimension education concerns all educational activities of the entrepreneurship education program. The larger the number of courses and degrees offered in entrepreneurship education, the more students can be educated to develop an entrepreneurial mind-set (education scope). Besides the content of the courses and its accessibility to students, the didactic methods are important for students to acquire an entrepreneurial mind-set (Lans & Gulikers, 2010) (education set-up). The indicator education set-up is well managed at the ERW5. However, regarding education scope there is room for improvement. In absolute numbers there are relatively few students attending entrepreneurship education, but in relation to the total number of students, their number is quite large (due to the size of the HEI). But nevertheless, more students can be reached. The ERW5 only offers general entrepreneurship courses and no other forms of entrepreneurship education. And besides, the number of courses offered is rather low. Therefore the first recommendation is to offer different entrepreneurship courses. The ERW5 should focus on increasing the scale of entrepreneurship education, to get more students involved in entrepreneurship education, also students from departments which are not directly associated with entrepreneurship should become involved in entrepreneurship education, by means of offering more course on entrepreneurship.

Outreach

Outreach activities are important because they offer students the opportunity to gain practical experience with entrepreneurship and, ultimately, to develop an entrepreneurial mind-set. Outreach activities are especially important for university students, because otherwise they might become

more isolated from the business world (NIRAS et al., 2008). Alumni and other stakeholders can play a vital role in offering students these practical experiences. When looking at the score of ERW5 on the indicators stakeholders and alumni, it can be concluded that there is room for improvement. There are already contacts with all types of stakeholders, but they do not contribute to the program yet. As there are no alumni yet, due to the short time of existence of the HEI, the ERW5 needs to develop a plan on how to use the potential of alumni to the fullest.

Secondly, the ERW5 can improve the dimension outreach by becoming much more involved in society, for example by creating an advice centre for people who have entrepreneurial intentions. These people should also be assisted by entrepreneurial alumni or other practitioners that can act as mentors. Furthermore, the spreading of entrepreneurship abilities in schools is good for the community and shows the institution's involvement in society. If the number of alumni increases, and that of the stakeholders as well, entrepreneurship education will benefit.

ERW6

The ERW6 can be seen as a good practice example. They perform high on all performance indicators and also score relatively good on all dimensions of entrepreneurship education. Especially the dimensions resources, institutional infrastructure and education reflect the scores on the performance indicators. One of the dimensions which could use more attention is the dimension development. Here the ERW6 could learn from other good practices.

Table VII. Strengths and weaknesses ERW6

Strengths	Weaknesses
Faculties have their own entrepreneurship plans	Little attention paid to entrepreneurship and knowledge valorisation in mission statement and strategic plan
High amount of students through education	Primary strategic responsibility at professor-level
Relatively many high-level managers acting as champions of entrepreneurship	Low investment in human resources
Relatively many peer-reviewed studies	Monitoring events outside university
Many resources available for the current program and new initiatives	
Many links with different stakeholders	
Good management of alumni	
High entrepreneurial involvement in its environment	
Good evaluation methods	

Strategy

The embeddedness of entrepreneurship in the strategy of the HEI can stimulate the development and assessment of the entrepreneurship education program. Furthermore, the integration of

entrepreneurship in the mission statement and the strategic plans gives an indication of the importance of knowledge transfer for the HEI (NIRAS et al., 2008). At the ERW6, the faculties have pretty much autonomy regarding their entrepreneurship education practices. Furthermore, there are clear written entrepreneurship education plans at all faculties. The ERW6 uses high level managers who are acting as champions of entrepreneurship to embed entrepreneurship in the institution. However, this embeddedness of entrepreneurship through the education institute shows room for improvement as entrepreneurship does not receives a central place in the mission statement or the strategic plan.

The placement of primary strategic responsibility is carried by the professor. This is beneficial for the communication within the staff involved in the entrepreneurship education program because they are clustered in the same building. However, literature shows that placement of primary strategic responsibility at the higher management levels within an institution positively affects the embeddedness of entrepreneurship through the whole university.

Education

The dimension education concerns all educational activities of the entrepreneurship education program. The larger the number of courses and degrees offered in entrepreneurship education, the more students can be educated to develop an entrepreneurial mind-set. Besides the content of the courses and its accessibility to students, the didactic methods are important for students to acquire an entrepreneurial mind-set (Lans & Gulikers, 2010). Like almost every other HEI the ERW6 offers the three most common types of education. Individual courses can be attended, a B.Sc. minor is offered and a PhD in entrepreneurship. But the ERW6 also offers a full Bachelor and a M.Sc. minor, which makes the ERW6 an example for all other HEIs. The students that become interested in entrepreneurship in their bachelor stage are enabled to enrol in entrepreneurship education aimed at master students.

The ERW6 is an average scoring university regarding the level of experimental and real-life entrepreneurial learning. Also, the number of contacts with private companies by students is average and can be improvement. This will benefit the entrepreneurial mind-set of students through practice. There are many contacts with stakeholders and alumni. Therefore it is likely that there are more opportunities for students to get in contact with companies.

Development

Entrepreneurship education should adapt to the ever changing needs and wants of the users of the education program and the stakeholders involved in the program. By continuously trying to improve the program, it can satisfy the actors which are involved (NIRAS et al., 2008). This dimension refers to

the effort to effectuate continuous improvement of entrepreneurship at the HEI. The dimension development is measured by three indicators which are subsequently: user-driven improvement, evaluation of goals, and investment in human resources. The ERW6 is one of the best scoring university on the dimension development. This is mainly due to the user driven improvement and the evaluation of students' career, stakeholder needs and evaluation whether goals and strategies are lived upon. Teachers are encouraged to become engaged in entrepreneurship education. However, they are not specifically trained for entrepreneurship education. Therefore the institution can choose to train current teachers or to appoint practitioners for the further development of entrepreneurship education courses like it is done at the other good practice examples. Besides, there is a lack of investment in human resources for entrepreneurship education. If ERW6 wants to have lecturers that are trained to teach the didactics needed for entrepreneurship, they should first of all use more means and different ways of encouraging teachers to become engaged in entrepreneurship education.6