Wageningen University – Department of Social Sciences

BSc research
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The drivers and barriers for collaboration between a non-profit sector and businesses

A study on collaboration between green education and entrepreneurs within the agriculture and horticulture sector

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ABSTRACT

The aim of this research project is to gain insight into the drivers and barriers for collaboration between green MBO/HBO institutes and entrepreneurs within the green sector. The goal is to identify the conditions for participation of businesses in education and vice versa.

The research subject is investigated through a literature research, where the studied topics are the profit and non-profit sector, collaboration between these two sectors (cross-sector collaboration), and collaboration between green education and the green sector.

The literature research shows that drivers for profit/non-profit collaborations may for example concern additional financial resources, services or goods, creating of and/or access to (new) technology, knowledge and products, and the need for product and/or process innovation. The differences in culture, goals, objectives, languages and values are examples of possible collaboration barriers. Success factors for collaboration between two parties are factors as trust, commitment and communication.

Implementing a course like Academic Consultancy Training (which is currently implemented at Wageningen University) is a possibility for green MBO/HBO institutes, in order to engage in a collaboration with entrepreneurs in the green sector.

Key words: cross-sector collaboration, drivers, barriers, green education, green sector.

MANAGEMENT SUMMARY

Due to the presence of several issues within the agriculture and horticulture sector, i.e. green sector, a possible mismatch is identified between the demanded knowledge and qualities of graduates within Dutch green education (MBO and HBO education), and the actual requirements from Dutch businesses. There is a need for new, future focused knowledge and insights, and the quality of the current education should be improved in the perspective of entrepreneurs in the green sector. In combination with worldwide dynamics (causing continuously changing requirements from businesses towards green education), are both the green sector and green education facing various challenges and developments. This requires greater interaction between green education and agricultural firms, i.e. cross-sector interaction. Therefore, research results should be gathered on the conditions for participation of businesses in education and vice versa: the collaboration between a profit and non-profit sector. In order to achieve this objective, the following research question is composed:
What are the drivers and barriers for collaboration between a non-profit sector ("green education") and businesses (entrepreneurs within the agriculture and horticulture sector)?

During the execution of the research project, which consists of a literature research, it appeared that literature on the collaboration drivers and barriers between green MBO/HBO and entrepreneurs within the green sector is hard to find. For this reason, two other types of profit/non-profit collaboration are studied, namely social collaborations and industry/university collaborations.

The results of the study on social and industry/university collaborations show that due to the difference in nature and characteristics of a profit and non-profit organization, several benefits as well as conflicts can arise when these two organizations have (or engage in) a collaborative relationship. Examples of some potential collaboration drivers in case of profit/non-profit collaboration are: additional financial resources, services or goods, creating of and/or access to (new) technology, knowledge and products, and the need for product and/or process innovation. Collaboration barriers may for example involve the differences in culture, goals, objectives, languages and values. Factors as trust, commitment and communication can act as success factors for collaboration between two parties.

A possibility to engage in a collaboration with entrepreneurs in the green sector, green MBO/HBO institutes can implement a course like Academic Consultancy Training (which is currently implemented at Wageningen University). Such a course gives students and teachers the opportunity to work on 'real' business problems and to gain insight into current and/or future developments and challenges within the green sector. It will benefit entrepreneurs through gaining another perspective on how to solve their business problem(s) and how to deal with the current and/or future developments and challenges.

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1. INTRODUCTION

A Dutch higher professional education institute (in Dutch referred to as HBO – Hoger BeroepsOnderwijs) has introduced a research project on "sustainable collaboration between education and entrepreneurs". Wageningen UR and LEI Wageningen UR are the contractors. The initiation of this BSc research project is based on the research request from the HBO institute. Therefore, section 1.1 provides (shortly) more information about the subject of the research request.

1.1 RESEARCH SUBJECT[1]

Several issues are currently present within the agriculture and horticulture sector:

- Shortage of qualified staff within agriculture and horticulture firms. Some firms are educating own staff again.
- Decreasing number of graduates who become an entrepreneur. The number of firms in agriculture and horticulture is still decreasing each year.
- An increased need for new, future focused knowledge and insights. The society demands sustainable agricultural firms which make a connection to their environment.
- Critical attitude among existing entrepreneurs regarding the quality of the current education. This is commented by the Agricultural and Horticultural Organization Netherlands (in Dutch: Land- en Tuinbouw Organisatie Nederland, LTO) in the past years.

These issues indicate a possible mismatch between the demanded knowledge and qualities of graduates within the "green education" and the actual requirements from business.

Due to worldwide dynamics are continuously changing requirements from business towards green education (especially regarding insights in new and future focused knowledge and a change-oriented entrepreneurial attitude among graduating MBO and HBO students). In order to realise this, the green education and agricultural firms need greater interaction. To develop well educated entrepreneurial persons, a lot of contact is needed with the business because students and teachers then know the current ins and outs, and what the necessities will be in the future.

1.2 STRUCTURE OF THE REPORT

Chapter 2 gives some background information on the involved sectors and chapter 3 focuses on the problem analysis of the subject of this BSc research project. Subsequently, the literature research results are presented in chapter 4. Chapter 5 discusses the applied methodology. The conclusions and the discussion of the conclusions are shown in chapter 6. Appendix I presents the definitions of the concepts and abbreviations that are used in this document.

[1] Source: "Duurzame verbinding tussen Onderwijs en Ondernemers" (2012).

2. BACKGROUND – SECTOR DESCRIPTION

The research project focuses the green sector – entrepreneurs within the agriculture and horticulture sector – on the one hand and on green education on the other hand. This chapter provides therefore information on the green sector and (green) education, specifically in the Netherlands.

The green sector in the Netherlands

The green sector (agri-food) in the Netherlands consists of primary production (animal husbandry, fishery, arable farming and horticulture), food processing (dairy, meat and vegetables), rural affairs and natural environment (Kupper et al., 2012; Wals et al., 2012).

> ***The agri-food sector: "All economic activities in the production, processing and distribution of agricultural products (food and non-food) of domestic and foreign origin (Ministry of Agriculture, Nature Management and Fisheries, 2000)" (Lans et al., 2004, p. 77).***

Agricultural activities are well represented within the Netherlands and also internationally: (1) for the primary sector (fields related to trade, processing industry and service organizations), agricultural activities occupy approximately 55% of the land mass in the Netherlands (Kupper et al, 2012); (2) the (trade in) agricultural and horticultural products accounts for 10% of the Dutch GNP and also 10% of the employment in the Netherlands (http://www.rijksoverheid.nl); and (3) the Netherlands is, after the USA, the largest exporter of agricultural produce worldwide (agriculture accounts for 17,5% of the total Dutch export) (http://www.rijksoverheid.nl) with horticultural produce, meat and dairy as the three largest export groups (Kupper et al, 2012). Dutch companies as Unilever, Heineken, Friesland Campina and Nutreco underline the international orientation of the Netherlands within the food industry (Wals et al., 2012).

The Dutch government even appointed horticulture as well as agri & food as two of the nine top sectors in the Netherlands (http://www.top-sectoren.nl), which receive special attention from the Dutch government for innovative incentives. About top sector 'Agri & Food': "This internationally leading sector includes various (vegetable and animal) food chains with different links per chain, such as the supply industry, materials, primary production, processing (food) industry, auctions, trade, retail and out of home sector and finally the consumer, home and abroad" (http://www.top-sectoren.nl, own translation).

Next to the 'success' figures of the Dutch agriculture sector, is the sector also known for successful collaboration between research, education and extension (referred to as the 'REE-triptych') (Wals et al., 2012): scientific innovations – new knowledge created and developed through research – should be transferred by intermediaries (like extension workers and educators) to farmers (Van den Ban, 1987 & Vijverberg, 1996 in Wals et al., 2012). The REE-triptych determined the learning of Dutch agri-food entrepreneurs (Lans et al., 2004) before it fell apart a decade ago: "Extension was commercialised, research became more market driven and the knowledge resulting from public-private projects no longer was for free and thereby more difficult to access and use in education" (Wals et al., 2012, p. 5).

The Ministry of Agriculture, Nature and Food Quality is the main funder of research and education (and financially supports the collaboration between research, education and extension because of the knowledge intensive character of the sector), and has therefore quite some influence on the direction of research and knowledge development (Wals et al., 2012). However, the research

and education agenda is set up by the private sector in collaboration with the public sector in the agri-food domain (Wals et al., 2012).

In the green sector, the number of businesses for primary production has been declining for several years, but the total yield is not decreasing as consequence of scale-enlargement of present businesses and technological process (Kupper et al., 2012; Statistics Netherlands, 2012). The green sector faces several developments, including a change in business models (from bulk products to value-added produce for niche markets), competition for land use with parties which envision another way of exploitation, and the exploration of new markets (Kupper et al., 2012). Exploring new markets and carrying out secondary/side-line activities makes the green sector more diversified.

Dutch educational system

The Dutch educational system consists of primary education (similar for all pupils), secondary education (three levels: VMBO (consisting of four levels), HAVO or VWO), followed by vocational (MBO) or higher education (HBO, i.e. higher professional education, or WO, i.e. academic education) (Kupper et al., 2012), as shown in figure 1:

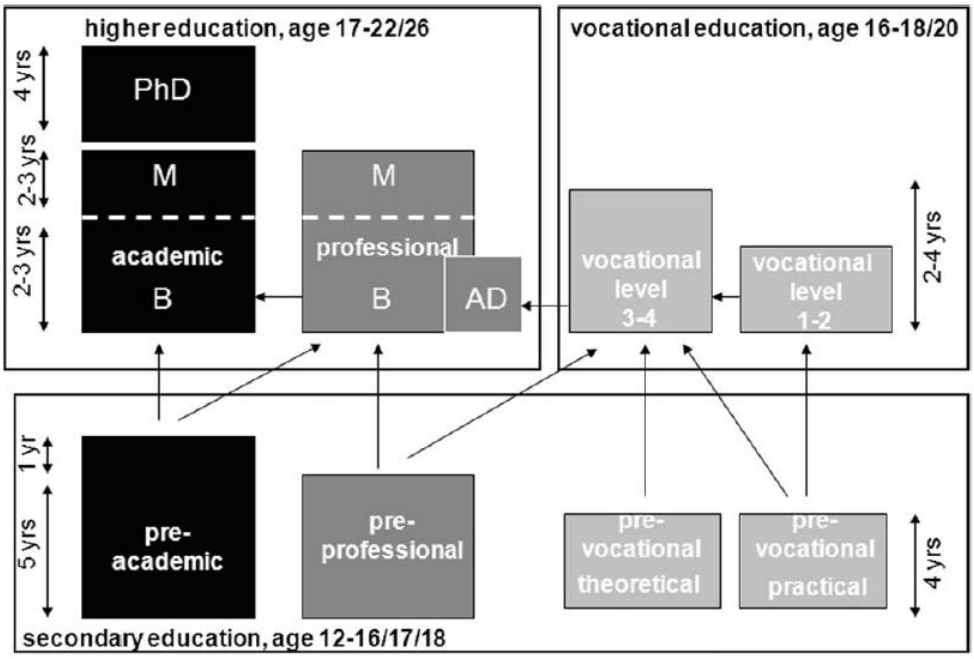

Figure 1. The Dutch formal education system (derived from Wals et al., 2012, p. 6).

According to Mulder (2010), all senior secondary vocational education (MBO) have a competence-oriented qualification structure, and for each educational program are core tasks, working processes and competence specifications defined.

Green education in the Netherlands

Dutch green educational programmes, involving studies in the field of agriculture, living environment (nature) or food, are affiliated with the Ministry of Economic Affairs, Agriculture and Innovation (Kupper et al., 2012). The structure of green educational programmes is in accordance with the general Dutch educational system. Students can enrol for green education at the level of secondary, vocational and higher education (Kupper et al., 2012): agricultural education programmes provide

potential employees to the labour market with a great variation in educational background as well as level of education (Mulder, 2010). Wageningen University and Research Centre (WUR) is the 'centre of public knowledge base', where most of the fundamental and applied research is carried out (Wals et al., 2012), and is the only academic institute in the Netherlands which offers green education.

> ***"The societal mission of green education is to contribute to the development of qualified human resources for the green sector as well as to the adequate dissemination of new knowledge within that sector and society at large (Ministry of Economic Affairs, Agriculture and Innovation, 2010)" (Kupper et al., 2010, p. 122).***

Only a small amount of students in (pre) secondary vocational education and higher (professional) vocational education choose for agri-food related vocational education and training (VET) – i.e. green education – or life sciences (Wals et al., 2012). This is shown in table 1.

Table 1. Non-green and green student enrolment in 2008/2009 (derived from Kupper et al., 2012, p. 126).

		MBO					
Enrolment 2008/2009	**VMBO**	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**HBO**	**WO**
Non-green	212,229	21,600	134,100	136,600	216,500	383,883	213,900
Green	31,488	2,142	6,479	7,114	11,399	7,909	6,146
Ratio	14.8%	9.9%	4.8%	5.2%	5.3%	2.1%	2.9%

The study of Mulder & Kupper (2006) pointed out that three scenarios (or a combination) were possible for green educational institutes, for coping with expected developments: evaporating, dissolving or crystallizing. The latter scenario, crystallizing, actually occurred in the years after the study of Mulder & Kupper (2006) (Kupper et al., 2012): green education institutes work, when possible, together within the green sector or organize themselves as independent green education institutions (Mulder & Kupper, 2006). Many green educational institutions follow a strategic collaboration strategy (corporate restructuring or alliances), with a horizontal (at the same educational level) or vertical (collaboration with institutes at different educational levels) orientation, and deploy joint activities with green or non-green educational institutes (Kupper et al., 2012). It appears that "green educational institutes organize themselves in larger and regionally dispersed organizations" and that joint activities are part of the Green Knowledge Co-operative (GKC) (Kupper et al., 2012, p. 122). According to the GKC (2011) are green educational institutes partners for businesses in the green sector in the co-innovation process.

> ***"According to current political opinions, the green knowledge system, now consisting of independent – at a certain distance from government – bodies for research, consultancy and education, has to work more and more in compliance with market rules. The once public extension service not only became independent of direct governmental influence but is now fully privatized. Public research in centers for life sciences also has become more dependent on market demand, and co-financing from private parties is often a requirement for public funding. Generally speaking, green education and green research are becoming more inter-related" (Kupper et al., 2012, p. 129).***

As being part of the nine top sectors, the government tries to make the green sector more innovative: green education should therefore be innovative regarding the educational quality as well as supporting the competitiveness of the green sector at (inter)national level (Kupper et al., 2012).

3. PROBLEM ANALYSIS

3.1 IDENTIFIED PROBLEM

Building up and maintaining a sustainable collaboration between education and entrepreneurs within the green sector, with sufficient benefits for both parties, implies collaboration between a non-profit oriented sector and a profit oriented sector. The description of the current situation (the research subject, section 1.1) indicates that the conditions for an optimal collaboration between the non-profit and profit sector are not (sufficiently) identified.

3.2 RESEARCH OBJECTIVE

The research objective is the goal of the research project: how can the knowledge that is gained through the research be used to solve the problem? (Verschuren & Doorewaard, 2010)

The primary goal of this research project is:
Yield literature research results for green education and businesses in the agriculture and horticulture sector on the conditions for participation of businesses in education and vice versa.

This primary goal is divided in the following sub-goals:

- Identification of the characteristics of the non-profit sector and businesses (profit sector).
- Identification of the drivers and barriers for collaboration between the non-profit sector and businesses.
- Identification of the drivers and barriers for collaboration between green education and businesses in the agriculture and horticulture sector.

3.3 CONTRIBUTION TO RESEARCH AND RELEVANCE

It is not applied to MBO/HBO education, however, four reasons can be identified for investigating alliances between businesses and universities (Cyert & Goodman, 1997):

- The importance of business/university alliances is increasing by producing patents, prototypes and licenses through their research projects.
- Business/university alliances may play an important role in terms of global competitiveness, and product and process innovation.
- A business/university alliance can be a first step towards a more complex collaboration (which may involve multiple businesses, universities and other organizations).
- On the level of national R&D policy play business/university alliances a role for the distribution of resources and national competitiveness.

According to all stakeholders of the green sector (i.e. education, research, businesses and government) are new ways to create, share and distribute knowledge necessary since both green education and the green sector face challenges and developments. These concern for example the introduction of competence-based education, and complex issues as sustainability. Although the green sector is knowledge intensive, there is limited known on factors that contribute to knowledge transfer, circulation or co-creation processes. (Wals et al., 2012)

The relevance of this research project is also reflected in the following citation:

> ***"Green business is not merely concerned with international competition but more and more prominently with societal acceptance at national, regional and local levels. Integration of concerns about nature, environment and animal welfare with production systems is crucial for a sustainable green sector in the Netherlands. Traditional linear diffusion of knowledge is no longer considered appropriate for dealing with these systemic questions. Consequently, green education as part of the knowledge system also reconsiders its position" (Kupper et al., 2012, p. 131).***

3.4 RESEARCH QUESTIONS

In order to execute the research project, a general research question is formulated and divided into several specific research questions:

General research question

What are the drivers and barriers for collaboration between a non-profit sector ("green education") and businesses (entrepreneurs within the agriculture and horticulture sector)?

Specific research questions

1. What are the characteristics of a non-profit sector and a profit sector?
2. What are drivers and barriers for collaboration between a non-profit sector and a profit sector?
3. How can collaboration be promoted between green education and entrepreneurs in the agriculture and horticulture sector?

4. LITERATURE RESEARCH

This chapter describes the literature that is studied for the research project. There is a focus on literature concerning the profit and non-profit sector (section 4.1), collaboration between these two sectors (cross-sector collaboration, section 4.2), and collaboration between green education and the green sector in specific (section 4.3).

The research questions, which were presented in section 3.4, will be answered through this chapter. The answers to the research questions can be found in chapter 6. The definitions of the different concepts that are used throughout this chapter, as well as abbreviations, can be found in appendix I.

4.1 THE PROFIT AND NON-PROFIT SECTOR

For-profit businesses and non-profit organizations differ in objectives, cultures, operating styles (Sagawa & Segal, 2000) and motivation (Rhoades-Catanach, 2000; O'Connor & Raber, 2001 in Hull & Lio, 2006). Compared to profit organizations, non-profit organizations face some unique challenges, such as extensive social responsibility and complicated restrictions on strategic and financial actions (Hull & Lio, 2006).

> ***"A non-profit organization is equally responsible to multiple groups, including the supporters who fund it, the employees and volunteers who run it and the clients to whom it provides goods or services. A for-profit's primary responsibility is to its shareholders. Since non-profit employees are driven less by financial incentives and more by the results of their work, they will probably be less tolerant of a failure of the organization to fulfil its vision. For-profit employees may be more forgiving, provided that the failure does not prevent the organization from paying its employees" (Hull & Lio, 2006, p. 59-60).***

Table 2 provides an overview of the characteristics of organizations in the profit and non-profit sector, in a number of categories. This table shows that there are numerous differences between a profit and non-profit organization.

Table 2. Summary of not-for-profit and for-profit organizational differences (derived from Hull & Lio, 2006, p. 60).

Category	Not-for-profit	For-profit
Vision	Typically defines overall goal of organization	Serves a guide for how profit is achieved
	Organizational actions work directly to promote vision	More of an ideal then a constraint
Scope of Impact	Key objective of organization Create as much societal change as possible	Scope of impact evaluated primarily in regard to effect on profit
Performance Expectations	Complicated, multifaceted, and often subjective system for performance evaluation	Performance typically calculated objectively through measures of profitability
Strategic Constraints	Often faced with limited and conflicts options	Actions must be made in the best interest of shareholders/profit
	Larger number of constraints due to extensive responsibility network	
Ownership and Responsibility	Three key areas of responsibility (Supporters, employees, and clients)	Responsible to shareholders
	Complicated and interdependent reporting system	
Markets	Organization is typically defined by its market	Great deal of flexibility limited only by internal leadership and core competencies
	Little if any flexibility	
Financial Constraints	Revenues come from supporters or services	Revenues come from services or goods
	Loss of supporter approval results in a loss of revenue	Must use current resources to increase future resources
Revenues	Must balance service and revenue	Seeks revenue maximization
Incentives	Employee work to create societal change	Employees are motivated by money
	Employees typically receive lower salaries and fewer benefits	Typically higher paid

In terms of risk taking, non-profit organizations tend to be considerably more risk-averse than for-profit organizations, because of – for example – the more complex structure of responsibility within non-profit organizations (Hull & Lio, 2006). Since risk taking can be linked with innovation (Covin & Slevin, 1998), are non-profit organizations further away from the innovation path than profit organizations. This is due to the combination of the non-profit's complex responsibility structure and other structural and policy differences that exist between profit and non-profit organizations, and also because innovation is not necessary for sustainable operation by a non-profit organization. (Hull & Lio, 2006)

> ***"Non-profit organizations have a low tolerance for risk, due to the fact that a failure in any area of the organization may effectively destroy the organization. For-profit organizations, by contrast, may even be expected to be willing to take risks in the hope of obtaining a better return on their owners' investments" (Hull & Lio, 2006, p. 61).***

The difference between a profit and non-profit organization is also present in an alliance. In an alliance, a business expects all partners to provide value, while a non-profit organization expects a business to help with its mission (Sagawa & Segal, 2000).

The profit sector versus education as non-profit sector

Education, as being part of the non-profit sector, has obviously a very different nature compared to that of a business. Universities (for example – as part of the whole educational sector) have a public role and expectations: these institutes are expected to develop and disseminate knowledge and to educate and publish, i.e. making knowledge freely and widely accessible (open nature of the science system) (Dasgupta & David, 1994; Elmuti et al., 2005). In contrast, businesses operate in market places and compete for customers and investors, where they should obtain and retain a competitive edge in order to generate profits and to grow (Elmuti et al., 2005). In order to achieve competitive advantage, businesses need to capture valuable knowledge (Dasgupta & David, 1994). The 'private' knowledge of a business is in most cases closed, or disclosed through filed patents (a restricted way of disclosing knowledge), mainly to obtain a temporary monopoly (Dasgupta & David, 1994). Though much of the business knowledge is closed, different types of knowledge exchange and leakage take place between businesses which operate in the same sector (Bruneel et al., 2010).

> ***"The primary motivation of firms' knowledge creation activities is the appropriation of knowledge for private gain, and openness to external actors is used as a strategic mechanism to gain advantage over competitors (Chesbrough, 2006)" (Bruneel et al., 2010, p. 859).***

Businesses and education also differ regarding the protection of the intellectual property (IP). As Santoro & Betts (2002, p. 43) argue: "industry and universities have different goals, philosophies, missions, and reward systems related to intellectual property rights, patent ownership and licensing".

Next section provides the results of the literature research regarding collaboration between a profit and non-profit sector.

4.2 PROFIT AND NON-PROFIT SECTOR COLLABORATION

Collaborative relationships can exist between organizations within the same sector (i.e. within-sector alliances), but collaborative relationships can also exist between organizations in different sectors (i.e. cross-sector alliances) (Varadarajan & Cunningham, 1995; Wymer & Samu, 2003). Although it can from section 3 be concluded that the focus of this research project is on cross-sector collaboration (i.e. profit/non-profit collaboration), the upcoming section discusses shortly 'traditional' within-sector collaboration.

Within-sector collaboration

A well-known form of collaboration between two parties is likely to be a business-to-business relationship. According to Gajda (2004), many terminologies are used to describe 'collaboration': joint ventures, consolidations, networks, partnerships, coalitions, collaboratives, alliances, consortiums, associations, conglomerates, councils, task forces, and groups. This research project focuses on the types of collaboration where collaboration involves the phenomenon of individuals or entities working together (Gajda, 2004), to develop – for example – a strategic alliance.

Strategic alliances refer to interorganizational cooperative strategies, where the collaborating businesses aim to achieve both common and individual goals (Varadarajan & Cunningham, 1995). A

strategic alliance can enable businesses to achieve certain short and/or long-term goals, by means of collaborative effort, which may not be achieved when the businesses act independently (Gajda, 2004). Although the involved parties have a collaborative relationship in a strategic alliance, they remain independent organizations. In these business-to-business relationships (which are mostly long-term oriented) are trust and commitment important factors for success (Wymer & Samu, 2003). Other success factors for strategic alliances concern "partner selection, senior management commitment, clearly understood roles and communication between partners" (Elmuti et al., 2005, p. 120), as well as collaboration experience in interorganizational alliances (Hagedoorn & Schakenraad, 1994 in Bruneel et al., 2010).

> ***"Strategic alliances are intentional, interorganizational collaboratives created to benefit the partners and ultimately the stakeholders that they serve (Austin, 2000; Bailey & Koney, 2000)" (Gajda, 2004, p. 68).***

Examples of motives for entering strategic alliances are developing new technology, new products and new markets (Webster, 1992), as well as (Varadarajan & Cunningham, 1995):

- Access to new markets.
- Increasing the pace of entering new markets.
- Sharing R&D, manufacturing and/or marketing costs.
- Broadening or complement the product line.
- Learning new skills.

Cross-sector collaboration

When searching for studies on profit/non-profit collaboration, most studies seem to focus on subjects as social alliances, social partnerships and/or community projects (e.g. Austin, 2000; Samu & Wymer, 2001; Wymer & Samu, 2003; Selsky & Parker, 2005; Rangan et al., 2006; Eweje & Palakshappa, 2009). Although these types of collaboration involves other non-profit organizations than educational institutes, subsection 4.2.1 discusses social collaborations since some findings of these type of profit/non-profit collaboration may also be applicable for the research subject (as it also concerns cross-sector collaborations).

Specifically searching for studies on collaboration between education and businesses resulted in studies on industry/*university* collaboration (e.g. Santoro & Betts, 2002; Elmuti et al., 2005; Perkmann & Walsh, 2007; Bruneel et al., 2010). This type of collaboration exists especially in the field of research (research partnerships). Since industry/university collaboration is a form of cross-sector collaboration, and may therefore present usable results for the research subject, subsection 4.2.2 discusses this type of collaboration.

4.2.1 Social collaboration

The number of studies focusing on social collaborations as type of profit/non-profit collaboration may be explained by the enormous growth in cross-sector collaborative relationships, especially between businesses and non-profits (Samu & Wymer, 2001; Berger, Cunningham & Drumwright, 1999 in Wymer & Samu, 2003). Cross-sector collaboration between non-profits, businesses as well as governments is fostered by the convergence of political, economic and social pressures (Austin, 2000). Moreover, the growth of the size and influence of businesses, in combination with increasing public pressure on addressing social issues and environmental concerns, makes profit/non-profit

collaboration more and more important (Eweje & Palakshappa, 2009). This type of collaboration differs fundamentally from the 'traditional' business-to-business collaboration in the different types of involved organizations with their organization-specific motivations and goals (Andreasen, 1996).

> ***"Collaboration between non-profits and businesses is increasing and becoming more strategically important" (Austin, 2000, p. 69).***

Non-profits are in the context of social collaborations organizations like charities or organizations that provide social services, and social collaborations are defined as a "situation wherein business and non-profits collaborate and work together to achieve a successful outcome of a collective project initiated primarily to address specific needs that will improve the wellness of communities and society at large" (Eweje & Palakshappa, 2009, p. 340).

Types of social alliances

Profit/non-profit alliances in the form of social alliances exist in various forms: corporate philanthropy, corporate foundations, licensing agreements, sponsorships, transaction-based promotions, cause related marketing, joint issue promotion and joint ventures (Samu & Wymer, 2001; Wymer & Samu, 2003).

Motives for social collaboration and collaboration benefits

A key characteristic of social collaboration is the degree to which the business can obtain its own benefits versus furthering the non-profit's mission or cause (Wymer & Samu, 2003). Collaboration with non-profits is from a business point of view seen as useful in terms of corporate social responsibility (CSR): partnerships with an organization which endeavours a charitable or societal cause, may positively contribute to the CSR activities of a business (Eweje & Palakshappa, 2009). Moreover, a business/non-profit collaboration may also increase the sales of the business, support the business in furthering its objectives, and may contribute to attaining a more positive image among the customers of the business (Samu & Wymer, 2001).

> ***"By forming and promoting an alliance with a non-profit organization, businesses can demonstrate their commitment to improving society, leading to brand differentiation, brand loyalty, and increased positive attitude towards the firm (Weeden 1998)" (Samu & Wymer, 2001, p. 49).***

In social collaborations, non-profits are engaged for the purpose of gaining another source of funding to increase contributions (Austin, 2000; Sagawa & Segal, 2000; Eweje & Palakshappa, 2009), since the funding from traditional sources – like government funding and corporate philanthropy (a financial contribution from a business to a non-profit organization) – is diminishing (Austin, 2000; Samu & Wymer, 2001). Furthermore, non-profit organizations may be involved in social collaborations to reach a broader market and increase awareness (Wymer & Samu, 2003) as well as increase credibility and recognition (Samu & Wymer, 2001). Other collaboration benefits for non-profits are additional services or goods, access to other businesses, technology and expertise and new perspectives (Austin, 2000).

Different collaborative values can be created within social relationships, depending on the type of relationship between the profit and non-profit organization. Austin & Seitanidi (2012) show in figure

2 the sources and types of value in case of sole-creation (value creation by independent activities of one of the collaborative parties (business/non-profit)) and co-creation (value creation by conjoined activities of the collaborative parties).

	Sole-Creation----------→ Co-Creation
SOURCES OF VALUE	
Resource Complementarity	*Low----------→ High*
Resource Nature	*Generic----------→ Distinctive Competency*
Resource Directionality	*Unilateral----------→ Conjoined*
Linked Interests	*Weak/Narrow----------→ Strong/Broad*
TYPES OF VALUE	
Associational Value	*Modest----------→ High*
Transferred Resource Value	*Depreciable----------→ Renewable*
Interaction Value	*Minimal----------→ Maximal*
Synergistic Value	*Least----------→ Most*
Innovation	*Seldom----------→ Frequent*
STAGES	*Philanthropic-----→ Transactional------→ Integrative-→ Transformational*

Figure 2. Collaborative value creation spectrum (derived from Austin & Seitanidi, 2012, p. 745).

The stages philanthropic, transactional, integrative and transformational show the relationship stages between the collaborating parties (ranging from low interaction intensity to high interaction intensity). This figure shows that most benefits are in co-creation. In case of co-creation, the business/non-profit collaboration can co-create significant economic, social and environmental value for society, organizations and individuals most effectively (Austin & Seitanidi, 2012).

Social collaboration conflicts

In case of social collaborations, several potential conflicts or risks exist. For example, differences in culture, goals, objectives as well as unequal learning or partner asymmetries can be collaboration conflicts (Eweje & Palakshappa, 2009). Furthermore, the risk exists that the names and reputations of involved organizations can be negatively influenced by the collaboration (Austin, 2000; Wymer & Samu, 2003). For businesses are the other potential risks the loss of sales or market share, and shareholder and employee resentment (when a business makes a financial contribution to a non-profit organization during periods of 'business down-cycles') (Wymer & Samu, 2003).

Success factors for social collaborations

Within a business/non-profit collaboration, it is important that the benefits (value definition and collaboration motivations) for the involved collaboration parties are clearly defined (Austin, 2000). The benefits of the collaboration should be weighed against the costs and, if applicable, risks (as far as all the benefits, costs and risks can be determined). Collaboration costs can for example be associated with deploying resources to set up and manage the collaboration instead of being put to an alternative use (opportunity costs), and the costs of management and staff (Austin, 2000).

"The fundamental viability of an alliance depends on its ability to generate value for each of its partners. (…) Imbalance in the value exchange may hinder the development of the relationship" (Austin, 2000, p. 84).

Eweje & Palakshappa (2009) present factors that are identified by scholars as being facilitators for a successful collaborative process. These factors include: having the right partners, partners independence, coincidence of values, having a skilled convenor, organized decision-making and environmental fit. Moreover, Austin (2000) identifies alliance drivers for businesses and non-profits which engage in a social collaboration, that contribute to the strength of the collaboration: (1) alignment of strategy, mission and values; (2) personal connection and relationships (for the creation of interorganizational trust); (3) value generation and shared visioning; and (3) continual learning. The so-called 'alliance enablers' support the alliance drivers. The alliance enablers concern factors as (Austin, 2000):

- Focused attention: the persons involved in the alliance are dedicated.
- Communication: communicating effectively efficiently and frequently, as well as being sincere and sharing constructive criticism. Good communication and trust are inextricably linked.
- Organizational system: clear definition of the management's responsibilities.
- Mutual expectations and accountability: the expected deliverables from each involved party are clear, which promotes mutual accountability and stimulates execution responsibility.

> ***"Trust appears to be one of the critical elements common to most forms of collaboration (Burke, 1999; Dickson & Weaver, 1997; Kanter, 1994; Larson, 1992; Rackham et al., 1996; Ring & Van de Ven, 1994; Waddock, 1988a; Wasserman & Galaskiewicz, 1994). Although good relationships will not guarantee alliance success, bad interpersonal relations can destroy a partnership" (Austin, 2000, p. 83).***

Now the features of social collaborations are described, is in the next subsection focused on another type of profit/non-profit collaboration: industry/university collaboration.

4.2.2 Industry/university collaboration

Although many studies focus on strategic alliances between businesses, there has been a drive for strategic alliances between businesses and higher education institutes mostly due to "the changing nature of global business and the subsequent need for overall competitiveness throughout many industries" (Elmuti et al., 2005, p. 126). The growth in industry/university interaction is also due to changing legislative environments, the increasing promotion of translational research and public-private research partnerships by the government, and the pressure for universities to be involved in the improvement of the national economic competitiveness (Perkmann & Walsh, 2007).

Types of industry/university relationships

In the past, industry/university relationships were mainly sponsorships (Santoro & Betts, 2002). Today, the emphasis seem to be on a knowledge-based economy, which has led to a shift from industry/university sponsorships to partnerships (Jacob et al., 2000). However, there are many different types of industry/university relationships. The relationship between businesses and universities is not necessarily in the form of a (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 business) or training (postgraduate training in business or training of company employees) (D'Este & Patel, 2007). Schartinger et al. (2002) also identify other types of knowledge interaction, which are presented in table 3 (with the corresponding formalisation of interaction, transfer of tacit knowledge and personal

contact for all types of knowledge interactions). Anyhow, each type of industry/university relationship implies a different level of co-ordination, interaction and knowledge exchange (Bruneel et al., 2010). Also, as the following citation indicates, the type of relationship may depend on the sector in which the profit organization operates.

> ***"US results indicate that, while collaborative research or research joint ventures are considered important in diverse sectors such as pharmaceuticals, steel, TV/ radio and aerospace, academic consulting is highly relevant in various sectors such as food, medical equipment, petroleum, metals, search/navigational equipment and pharmaceuticals (Cohen et al. 2002, 16) (…) By contrast, sectors emphasizing incremental improvement rather than scientific breakthroughs, such as mechanical engineering or software development, show a preference for research services" (Perkmann & Walsh, 2007, p. 265).***

Table 3. Types of knowledge interactions between university and firms[a] (derived from Schartinger et al., 2002, p. 305).

Types of knowledge interaction	Formalisation of interaction	Transfer of tacit knowledge	Personal (face-to-face) contact
Employment of graduates by firms	+/−	+	−
Conferences or other events with firm and university participation	−	+/−	+
New firm formation by university members	+	+	+/−
Joint publications	−	+	+
Informal meetings, talks, communications	−	+	+
Joint supervision of Ph.D. and Masters theses	+/−	+/−	+/−
Training of firm members	+/−	+/−	+
Mobility of researchers between universities and firms	+	+	+
Sabbatical periods for university members	+	+	+
Collaborative research, joint research programmes	+	+	+
Lectures at universities, held by firm members	+	+/−	+
Contract research and consulting	+	+/−	+
Use of university facilities by firms	+	−	−
Licensing of university patents by firms	+	−	−
Purchase of prototypes, developed at universities	+	−	−
Reading of publications, patents etc.	−	−	−

[a] +: interaction typically involves formal agreements, transfer of tacit knowledge, personal contacts; +/−: varying degree of formal agreements, transfer of tacit knowledge, personal contacts; −: interaction typically involves no formal agreements, no transfer of tacit knowledge, no personal contacts.

In case of contract research (exploring a specific problem which has not been researched yet) and consulting (exploiting existing expertise), the university is paid by a business where the business decides what type of expertise or service is required, and defines the objectives and deliverables. Although the benefits are mainly for the business, the university will learn about the business' technological contexts and problems. Contract research and consulting is in contrast with collaborative research/research partnerships, where some degree of academic freedom exists (generally speaking, research services are in the perspective of the university less of academic value than research partnerships). (Perkmann & Walsh, 2007).

Industry/university relationships usually involve four interrelated components: research support, cooperative research, knowledge transfer and technology transfer (Santoro, 2000). Figure 3 shows these different dynamics of industry/university relationships and the tangible outcomes, in case the of a technology-oriented alliance. The upper arrow implies that higher intensity industry/university relationships produce higher levels of tangible outcomes than those with a lower intensity level. The

lower arrow implies that higher levels of generated tangible outcomes from industry/university relationships will lead to a higher intensity of the relationship.

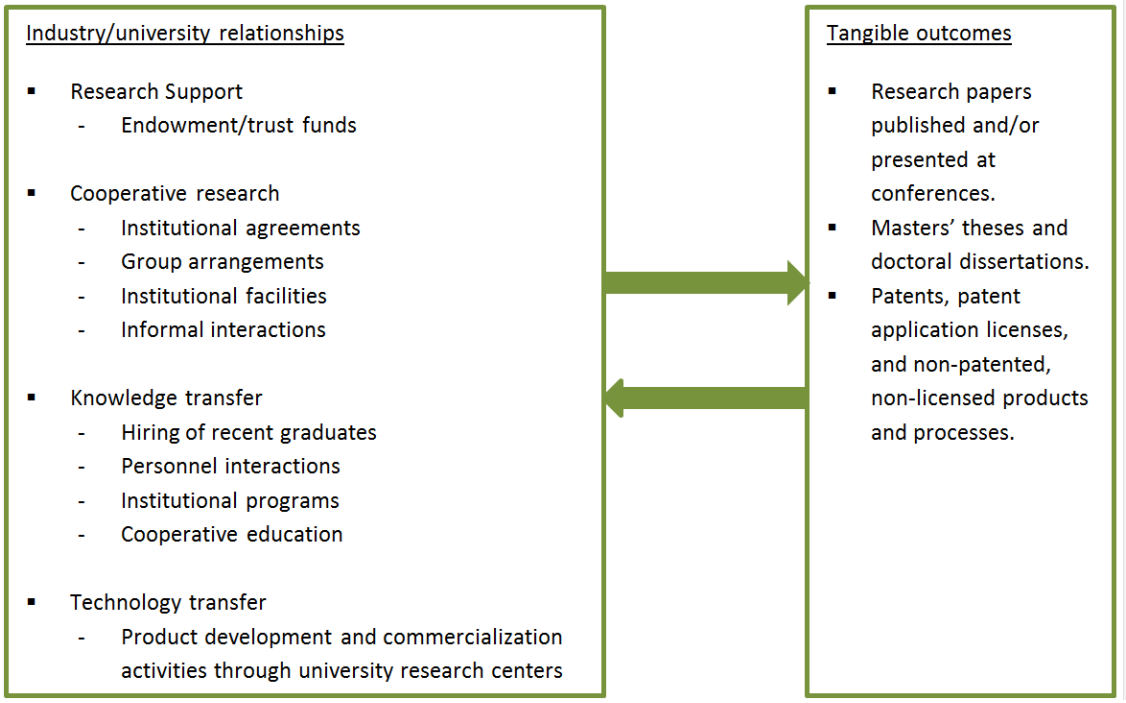

Figure 3. Dynamics of industry/university technology alliances and tangible outcomes (derived from Santoro, 2000, p. 259).

Although figure 3 shows the dynamics and tangible outcomes of industry/university *technology* alliances, it presents the potential outcomes of a successful alliance. Cyert & Goodman (1997) also appoint to new products, publications, patents, trained students, hired students, a new research agenda, new curricula, better methods to educate students, and established new enterprises as potential collaboration outcomes. In contrast, Perkmann & Walsh (2007, p. 272) argue that the expectations of businesses that are involved in industry/university collaborations, "tend to be informed by capacity-building and learning motives rather than tangible outcomes, an attitude that is promoted by public subsidies for most research partnerships": the industry/university relationship is by businesses valued over the whole innovation cycle and not only for the initial acquirement of inventions (Perkmann & Walsh, 2007).

The industry/university collaboration process

As figure 4 shows, the industry/university 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. The collaboration activities will then be implemented and eventually evaluated.

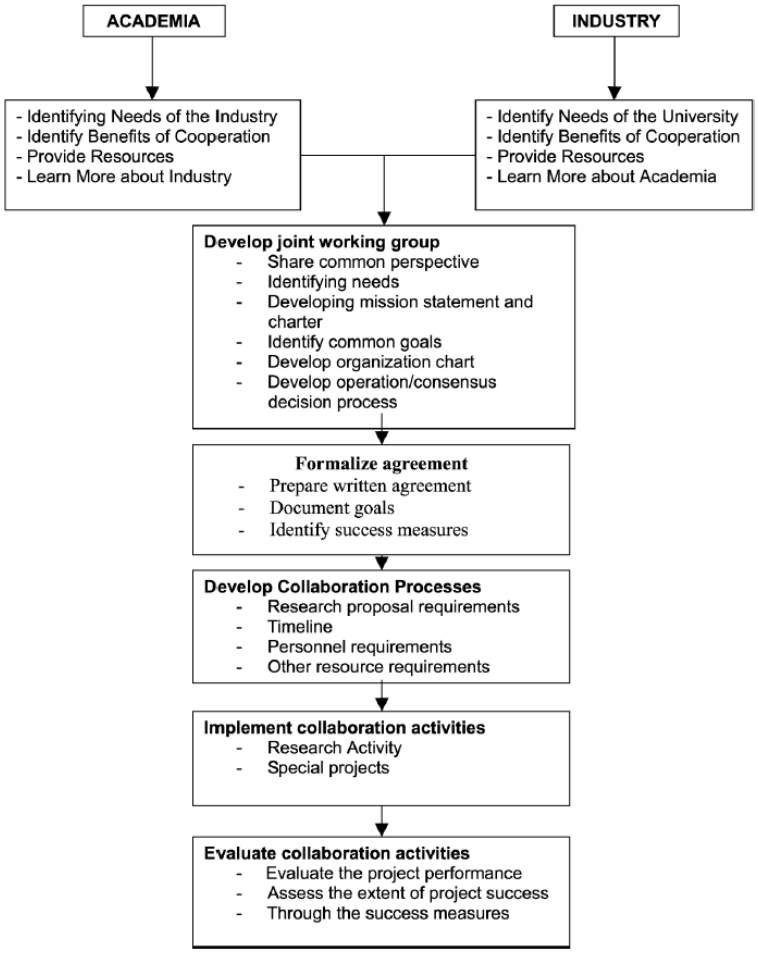

Figure 4. Industry/university collaboration process (figure of Mead et al., 2000, derived from Elmuti et al., 2005, p. 121).

Motives for industry/university collaboration and collaboration benefits

Traditional business-to-business alliances are formed for obtaining technologies, gain access to specific markets, reduce financial and political risk, and achieving or assuring competitive advantage (Wheelen and Hungar, 2000 in Elmuti et al., 2005). Industry/university collaboration can be initiated for the following reasons:

- Businesses can use research results to solve business problems (access to new knowledge and research findings) (Lee, 1998).
- Knowledge transfer activities and/or technology transfer programs ("integrate university-driven research into applied initiatives for the development and commercialization of new processes and products"), and/or efficient staff training programs (Elmuti et al., 2005, p. 117).
- (Rising) global competitiveness (Santoro & Betts, 2002; Elmuti et al., 2005).
- Lower R&D expenditure, and the increasing need for product and process innovation (Elmuti et al., 2005): interorganizational collaboration may contribute to developing and commercialising new technologies (Parkhe, 1993).

"They usually link the intellectual resources of a university with the problem-solving needs of a firm. While universities primarily interact with industrial firms to obtain basic research funding, access to proprietary technology, research tools and an opportunity to develop and bring technologies to the marketplace, they also collaborate to obtain industrial expertise, exposure to practical problems and

employment opportunities for university graduates (National Science Foundation, 1982; Ervin et al., 2002)" (Elmuti et al., 2005, p. 117).

Perkmann & Walsh (2007) argue that the motives of a business within a business/university collaboration vary, though these are commonly not restricted to generating and having access to readily commercialisable 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 (Caloghirou et al. 2001; Feller 2005)" (Perkmann & Walsh, 2007, p. 267).

Organizations increasingly rely on external innovation sources through inter-organizational relationships, i.e. they are engaging in 'open innovation' (Perkmann & Walsh, 2007): "a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as they look to advance their technology" (Chesbrough et al., 2006, p. 1). Advantages of external or cooperative innovation can be due to internal risk aversion and/or lack of internal expertise (Hull & Lio, 2006). Collaboration between businesses and scientists may for example, in the context of open innovation, 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 (Elmuti et al., 2005).

"In order to ensure their strong market presence and also effectively address ever-changing customer needs, corporations commit scarce and valuable resources to research and development (R&D). However, the current cost-cutting trend does not embrace expensive R&D programs that are intended to be conducted solely using the internal resources of the organization" (Elmuti et al., 2005, p. 126).
"Internal innovation offers a for-profit company the prospect of rewards due to first mover advantages, including the possibility of a temporary monopoly. Internal innovation also carries a heavier risk of failure than external or cooperative innovation due to, among other things, the uncertainty that an unproven innovation holds (Lengnick-Hall, 1991, 1992)" (Hull & Lio, 2006, p. 62).
"University research centers have proven to be beneficial partners for industrial firms seeking new ideas and new technologies" (Santoro & Betts, 2002, p. 42).

In the situation of industry/university collaborations for R&D purposes, the advantages for the education institute is receiving research funding and the opportunity for students to learn from "real" business situations (gaining real-world experience through practical learning opportunities) (Elmuti et al., 2005). Also, universities may create valuable IP to foster technology transfer, as result of collaborating with businesses (Bruneel et al., 2010).

"Universities mainly consider a partnership to be successful when there is a new research finding or when the discovery is published and the innovation is patented. Corporations, however, consider a relationship to be fruitful when the innovation or discovery can go quickly to the market or be commercialized. As long as the value gained from the partnership exceeds the costs of both partners, the basis of the alliance is set" (Elmuti et al., 2005, p. 127).

Additionally, in an industry/university collaboration, the university can provide complementary expertise, knowledge and resources to a business which may not be available within the business' community, as well as generating knowledge and new technologies (Santoro & Betts, 2002). E.g., businesses can hire graduates who participated in the industry/university collaboration (Santoro & Betts, 2002).

Table 6 in appendix II a. presents also other characteristics of industry/university relationships, from the university scientists' point of view, from most highly characterizing to least characterizing. This table shows positive as well as negative characteristics of industry/university relationships.

Industry/university collaboration conflicts

In contrast to the advantages and outcomes for both involved parties in an industry/university collaboration, are potential 'problems' associated with this type of collaboration. Although the literature on industry/university collaboration begins to discover the motives for, and forms of, collaboration between these two parties (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).

Due to the difference in nature of an university and a business there are, next to synergies, possible points of conflict when these parties collaborate, and therefore face industry/university collaborations some challenges (Bruneel et al., 2010). The main interest of businesses, when collaborating with universities, is the commercial application of research projects in the market place (Kock et al., 2000; Roth & Magee, 2002). As publication of research is critical for academic success and/or career sustainability of a researcher (as it is contributing to the reputation of the researcher) (Bruneel et al., 2010), it is imaginable that this priority from the university point of view may hinder collaboration with businesses. This can for example be the case when the direction of the research or collaboration is not in accordance with the requirements of the researcher to publish and/or the requirements of the business.

> ***"Because of the potential pitfalls, many firms remain reluctant to collaborate with universities. However, the changing competitive landscape is beginning to shape a new dynamic, especially with knowledge becoming increasingly more important to achieving competitive advantage" (Santoro & Betts, 2002, p. 43).***

Other potential conflicts which may occur in industry/university collaborations involve:

- Different working cultures, languages and values (which may cause communication difficulties) (Kock et al., 2000), as well as differences in objectives and the perception on goal achievement (Elmuti et al., 2005).
- Difference in knowledge production systems (as already shortly discussed in section 4.1): conflicts may arise on the research topics, types of outputs, and/or the timing and form of disclosure of research results (Bruneel et al., 2010).
- Institutional norms that govern public and private knowledge (Dasgupta & David, 1994).
- The university's attempt to obtain the commercial benefits from research (Bruneel et al., 2010).
- Uncertainty (when the relationship is beset with many unknowns) (Bruneel et al., 2010).
- The research generates results which are conflicting with the claims that a business wants to prove or disprove (Santoro & Betts, 2002)

"Academics wish to create 'leaky' knowledge so that their ideas will be acknowledged by their peers while firms want the knowledge to be 'sticky' so that they can control a resource that is not available to their competitors (Brown and Duguid 2000). 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)" (Bruneel et al., 2010, p. 859).

Santoro & Betts (2002) argue that industry/university partnerships often do not have the conflicts of interest which exist in interorganizational collaborations. However, when the university is expected to grant exclusive rights to businesses, it can affect the university's principal mission and responsibility to freely disseminate knowledge (Santoro & Betts, 2002). From the business' side of view, the disclosure of research may provide other businesses insight into knowledge which they can incorporate in products and processes (Santoro & Betts, 2002).

Bruneel et al. (2010) focus in their study[1] on '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 4. It appeared that (1) transaction-related barriers are considerable more difficult to alleviate than orientation-related barriers; (2) "prior experience of collaborative research lowers orientation-related barriers and that greater levels of trust reduce both types of barriers"; and (3) "that breadth of interaction diminishes the orientation-related, but increases transaction-related barriers" (Bruneel et al., 2010, p. 859). According to Bruneel et al. (2010), many types of barriers exist which influence industry/university collaboration: the orientation of the university and its researchers, the long-term orientation of the university, attitudes and behaviour of university administration and the TTO, and IP-related barriers and administrative procedures.

Table 4. Type of barriers to university interaction for SMEs and large firms (% of firms that agree or strongly agree with the questionnaire item) (derived from Bruneel et al., 2010, p. 864).

Type	Barrier	SME %	Large firms %
Orientation-related barriers	University research is extremely orientated towards pure science	31	36
	Long-term orientation of university research (concerns over lower sense of urgency of university researchers compared to industry researchers),	69	59
	Mutual lack of understanding about expectations and working practices	34	34
Transaction-related barriers	Industrial liaison offices tend to oversell research or have unrealistic expectations,	50	49
	Potential conflicts with university regarding royalty payments from patents or other intellectual property rights and concerns about confidentiality,	57	54
	Rules and regulations imposed by universities or government funding agencies,	58	53
	Absence or low profile of industrial liaison offices in the university (reverse coded)	27	24

Table 4 shows that (Bruneel et al., 2010):

- there are small differences between SMEs and large firms on the barriers to interact with universities;
- both SMEs and large firms indicate that orientation-related barriers are lower than transaction-related barriers.

Next to the already mentioned potential areas of conflict, may a relationship of an university with industry be undesirable (from the university's perspective) when the industry is involved in the courses and/or curricula of the university. Tucker et al. (2003, p. 26) argue that in higher education,

"collaboration with private industry in assessing content or delivery of a curriculum is viewed as a delicate issue to be entered into cautiously, if at all": decisions concerning the content of a course and curriculum is seen as issues which have to be determined by the faculty. When businesses participate in this matter (giving "feedback" on courses and curriculum), it is likely that businesses will focus on whether the educational program provides the necessary skills for employment. The faculty may perceive that these businesses have self-serving or commercial motivations or goals. (Tucker et al., 2003) However, "feedback from advisory committees, alumni groups and other private-industry stakeholders can be a valuable source of information in strengthening curricula and competencies of graduates" (Tucker et al., 2003, p. 28).

Success factors for industry/university collaborations

In an industry/university collaboration, both parties need to learn to work across their organizational boundaries and develop operating routines an practices to manage the collaboration (Bruneel et al., 2010). However, working across organizational boundaries is for managers in any type of organization one of the most difficult tasks to accomplish (Huxham & Vangen, 1996).

Furthermore, the involved parties should fully discuss their expectations and potential unforeseen situations (Santoro & Betts, 2002). It should from the university's point of view be assessed whether, in case of collaborative research, the collaboration will have a positive impact on the knowledge within the faculty's discipline, the current literature and the educational program (Tucker et al., 2003).

Trust has an important role within interorganizational relationships in general (Ring & Van de Ven, 1992) and also in industry/university collaborations (Santoro & Saparito, 2003), as commercially sensitive information and tacit knowledge is shared between the involved parties. According to Bruneel et al. (2010), interorganizational trust is a strong factor for diminishing barriers in industry/university interactions, and trust can be constructed by long-term investment in interactions, mutual understanding about different incentive systems and goals, and face-to-face contacts (involving multiple interaction channels and personal and professional relationships).

The next section discusses collaboration between two specific defined partners: green education and entrepreneurs within the green sector.

4.3 COLLABORATION BETWEEN GREEN EDUCATION AND ENTREPRENEURS IN THE GREEN SECTOR

The green sector is facing several developments and challenges, as already mentioned in chapter 2 and section 3.3. The developments within the green labour market and the society as a whole concern for example globalisation, the use of genetically modified organisms, climate change adaptation, the bio-based economy and sustainability (Wals et al., 2012). Kupper et al. (2012) mention the following challenges to which the Dutch green sector is exposed:

- Competition for arable land with construction, nature, infrastructure and recreation.
- Production methods which are accepted by critical citizens (expecting high quality, safe and healthy food) as well as debating on the 'license to produce' by environmental and animal welfare advocacy groups.
- Changing European agricultural policy.

- The attractiveness of the green sector for young people.
- Decrease in labour supply.
- Strong international competition.

These challenges are not only challenges for the green sector, but also for green education. As mentioned by Kupper et al. (2010, p. 121), "green education can contribute to solutions to these challenges/problems by building a strong organizational structure, providing the sector with adequate and up-to-date knowledge and by offering attractive learning environments". It is mentioned that a possible solution is the foundation of the Green Knowledge Co-operative (GKC).

> ***"It is plausible that the efforts (€ 50 million yearly from the government's budget for additional funds concerning innovative impulses) put in by GKC to emphasize the new position of education in the Dutch green knowledge system will pay off. Progress has been made in regionally embedding vocational education into the knowledge infrastructure, but relations with business and research grow at a slower rate than expected. Vocational education as an instigator for innovation cannot yet be observed. There are indications that teachers are not yet used to conducting practical innovative research. Currently, additional funds are made available for teachers' capacity building in the context of green lectorates (…)" (Kupper et al., 2012, p. 135).***

Green education

In agriculture – as similar to other sectors – the higher education segment generates the strongest job growth and it is expected that in the future over 50% of employment involves jobs with higher education requirements: there is still a growing demand for higher educated employees (Mulder, 2010). Therefore, higher agricultural education should aim at (1) the students' interests; (2) offering educational programs which address the requirements in science and society; and (3) offering graduates opportunities concerning further study, employment, and personal and career development (Mulder, 2010).

> ***"Higher agricultural education needs to deliver graduates who are competent in their field of study and the application of their knowledge and skills in doing research, present their findings effectively, design, teaching, project and program management, consultancy, acquisition and policy work while taking requirements of integrity and sustainability into account." (…) "The labour market demands competence graduates, education needs to provide the right competencies, students receive competence assessments, and the education programs are competence-based (Mulder, 2010, p. 2).***

Because of the developments within the green sector, several farmer organizations and the government are focused on strengthening entrepreneurial capacities; e.g., entrepreneurial courses are developed by green schools in collaboration with young farmers, and entrepreneurship has gained a more prevailing position within the curricula of VET and higher education (Kupper et al., 2012).

According to Veerman (2005), the Dutch green knowledge system should be praised, but both the green sector and green education face challenges and developments. In order to retain the successful green knowledge system, where the most important mission is promoting innovation and entrepreneurship, the government wants to invest in knowledge and the knowledge economy (Veerman, 2005). Therefore, education and research should become the key to innovation: revitalizing education, and improving the circulation and utilization of knowledge are points of action

to achieve the goals (Veerman, 2005). Veerman (2005) argues that the following factors will contribute to revitalize education:

- Implementation of competence-based education.
- Horizontal and vertical collaboration.
- More focus on a higher education level.
- Less drop-out of students.
- More focus on 'shaping' an individual student.

> ***"Knowledge circulation can be improved, and then I refer to the knowledge transfer between education, research and practice, i.e. the classical success formula for green education. I have high expectations of improved collaboration between education and industry. I previously mentioned education as 'preferred supplier' of knowledge for businesses and vice versa; there are still opportunities and missions in this area" (Veerman, 2005, own translation).***

As described by Kupper et al. (2012, p. 133, based on Veerman, 2005), can green education only face the challenges and developments if:

- The green educational system consists of a strong collection of institutes which offer high quality education attractive to students;
- Schools cooperate in the pre-competitive development of innovations for education and business;
- Schools maintain a robust link with research institutes;
- Educational institutes are recognized by business and societal organizations as reliable partners for innovation and for educating and training (future)entrepreneurs and employees to develop adequate vocational competence.

> ***"By bringing entrepreneurs and education closer to each other, a good interaction will arise. The best example is the entrepreneur who is occasionally for the classroom and vice versa. That leads to special and useful experiences. (…) Entrepreneurs have also much interest in a good knowledge system: it does not only provides the labour capacity of the future, but also labour- and entrepreneurial quality" (Veerman, 2005, own translation).***

Green educational programmes should focus on the development of qualified employees for the green sector (including supporting personal development), and distribute new knowledge towards this sector and the society as a whole (Kupper et al., 2012). Therefore, the next section focuses on competence-based education, a concept that focuses on the alignment between competence development of students and the competencies that are linked to jobs in the labour market.

Competence-based education

Developing competence-based educational programmes has become very popular in the Dutch VET system, as many stakeholders in the VET field expect that this concept can reduce the gap between the labour market and education: students within vocational education should obtain the necessary competencies for their future profession and in society (Biemans et al., 2004).

> ***"Competence-based education is the leading paradigm for innovation." (…) "There is a growing recognition of the need for vocational education to be directed at developing competencies and not***

just at acquiring a diploma; the emphasis has to be on capabilities and not on qualifications" (Biemans et al., 2004, p. 523-524).

Focusing on the development of capabilities within vocational education (i.e. competence-based education) should improve the connection between education and the (regional) labour market (Mulder, 2004; Wals et al., 2012). A strong connection between education institutes and (regional) stakeholders, such as research and businesses, is very important for obtaining the necessary competences to anticipate on developments within the green labour market and the society as a whole (Wals et al., 2012). The following statement on entrepreneurship also illustrates the importance for green education to focus on competencies which are necessary as entrepreneur in the green labour market.

"Entrepreneurship is defined as a certain mindset and process associated with individuals, who possess a set of competencies (e.g. creativity, risk-taking), showing these competencies in distinctive entrepreneurial behaviour (turning a business idea into success), alongside daily management" (Lans et al., 2004, p. 75).

Since professional education is focused on preparing students for certain jobs (Mulder, 2010), it is essential that these students gain the necessary knowledge as well as competencies for that job. In case of higher agricultural education, the following competence fields are important (Mulder, 2010):

1. Dealing with the complexity of the contemporary society.
2. Decreasing the gap between science and society.
3. Increased competition in the global market.
4. Coping with the issues of internationalization.
5. Switching between general and specific issues.
6. Dealing with human resources management and development.
7. Responding to the wishes of the capricious consumer.
8. Decreasing the gap between the consumer and the agricultural sector.
9. Dealing with the citizen-consumer paradox in sustainability decisions.
10. Balance between life style, sustainable production and quality requirements.

Competence-based education in higher agricultural education can in several variations be applied in practice. Mulder (2010) describes potential applications which are developed in Wageningen University: academic consultancy training including modular skills training and the pilot on competence assessment, study choice and career development. These possible applications of competence-based education are shortly discussed.

- Academic consultancy training (ACT) and Modular Skills Training (MOS) (section based on Mulder, 2010)

ACT is a course of 9 credits and encompasses a practical training format. Students can enter the course when they acquired a certain amount of credits, are competent in multiple basic skills (information and computer literacy, presentation skills) and a student's English communication skills enables him/her to make self-reflections, give and receive feedback and can work independently in teams with other students.

Teams of students (4-7 persons with interdisciplinary backgrounds) work as a consultancy team on a real-world project, which is commissioned by an external party. Each student team is

supported by a process and content coach and different roles are assigned to the team members. The teams have to design a solution for a problem that is presented by an external client, which can be a design of a new technology, policy paper, business plan, communication plan or research plan (an overview of the outcomes of the course and involved activities is shown in table 7, appendix II b).

> ***"The intention is that teams produce an interdisciplinary synthesis of the problem analysis and translate this into the project results as an advice for future actions of the client organization" (Mulder, 2010, p. 10).***

MOS (3 credits) is related to ACT and students can choose two MOS modules (for example: advanced presentation skills, negotiation skills, entrepreneurial skills or management skills). The MOS modules give students the opportunity to acquire the necessary skills for the labour market as graduates.

- Competence assessment, study choice and career development (section based on Mulder, 2010)

Competence-based education can also be implemented by starting "competence assessment for supporting study choice and awareness raising of the issue of career development" (Mulder, 2010, p. 13). The educational institute could set up a high-level university working group, which includes – among others – a person from a company in the corresponding sector, who focus on the improvement of students' competencies which are necessary for their future career.

The concept of competence assessment enables students to perform a self-assessment on competencies, motives and work cultures, and use the results for study and career planning.

Entrepreneurs within the Dutch green sector and lifelong learning

Due to economic liberalisation in the 1990s (which decreased the protection of agricultural markets), "accompanied by the privatisation of the agricultural knowledge infrastructure and extension, social-economic politicies and postmodern society, demanded a completely different approach from farmers with regard to their competence development" (Mulder et al., 2002 in Lans et al., 2004, p. 77). These developments made knowledge an important part of competition within the agricultural sector (Lans et al., 2004).

> ***"Society is changing and developing at an increasing rate, companies must adapt to the vagaries of the market and changing consumer habits, enhanced environmental regulations, new requirements for product quality, chain management, food safety, sustainability, and so on. The goals are not exactly determined, content is changing from time to time, but the orientation is obvious: innovation in its broadest sense. It is in this context not enough any more to master the right skills and knowledge to grow plants: integrated, multidisciplinary, transferable competencies will be important to cope with these changes" (Lans et al., 2004, p. 77-78).***

The necessary transferable competencies – to which is referred to in the above citation – are for example communication, strategic-efficiency and organizational competencies; i.e. entrepreneurial competencies (Lans et al., 2004). These competencies should be obtained through learning activities, beginning in initial education (Lans et al., 2004), and be subject for lifelong learning for entrepreneurs (Janssens, 2002 in Lans et al., 2004). Lifelong learning is in this context defined as "a continuous, stimulating and supporting process, initiated in regular education, supporting needs, possibilities and experiences of persons, to develop the ability to acquire competencies necessary for personal development and professional functioning in their own organisation and the rapidly

changing society" (Lans et al., 2004, p. 78). The concept of lifelong learning may give an impulse to collaborations between education and entrepreneurs since this type of collaboration can provide the necessary elements of lifelong learning to both involved parties.

Collaboration between education and entrepreneurs

As mentioned in section 1.1, a possible mismatch exists between the knowledge and qualities of graduates and the requirements from businesses. It is therefore supposed that green education and agricultural firms need greater interaction, in order bring students and teachers up to date with the current ins and outs, and what the necessities within the green sector will be in the future.

Tucker et al. (2003) argue that involving businesses in courses and curriculum will, indeed, make it possible that the educational program can be (constantly) adjusted to the needs of the industry. Mutual (research) objectives can be acknowledged and pursued when education and businesses collaborate (where businesses may provide funding opportunities) (Tucker et al., 2003).

> ***"Various business organizations point out that high quality education, either by proliferation of educational programs or collaboration between educational institutions and entrepreneurs, is essential for companies to attract those with great potential and for the Netherlands as a means of maintaining its strong international position (VNO-NCW, MKB-Nederland & LTO Nederland, 2010)" (Kupper et al., 2012, p. 131).***

Policy-makers argue that agricultural businesses need a stronger entrepreneurial attitude (Pyysiäinen et al., 2006) – where new knowledge has an important role – in order to remain on the competitive edge. According to Lans et al. (2004) have entrepreneurs two main characteristics, that distinguish them from 'ordinary' business owners: they innovate and learn. The need for innovation and learning, and thereby retaining a competitive position, may be a motivation for entrepreneurs in the green sector to collaborate with education. The collaboration can in this case be in the context of knowledge transfer and innovation: as the green sector is very knowledge-intensive, businesses in this sector should be up to date with relevant (new) knowledge and technologies in order to retain a strong competitive position within the market. But the collaboration works both ways: students and teachers are becoming also up to date with the present business problems, developments and challenges.

> ***"The institutes for green education have become larger in scale with stronger positions in the distinct regions. They are able to act as robust nodes in the Dutch knowledge infrastructure. For a knowledge intensive sector like agri- and horticulture such an infrastructure is necessary for innovation in the green sector. After all, innovation, apart from the entrepreneurial ability to recombine new developments, is favored by adequate research and education" (Kupper et al., 2012, p. 136).***

As figure 5 shows, knowledge exchange relationships should exist between education, research, entrepreneurs and public administration, in order to optimize the knowledge system. Wals et al. (2012) point out that multiple factors are influencing the quality of "new, innovative, arrangements between education, businesses, industries, research and development" (Wals et al., 2012, p. 6), what is called a knowledge configuration: the way the actors are connected, the type of (learning) environment, the personal characteristics of each actor and the characteristics of their corresponding organizations and networks.

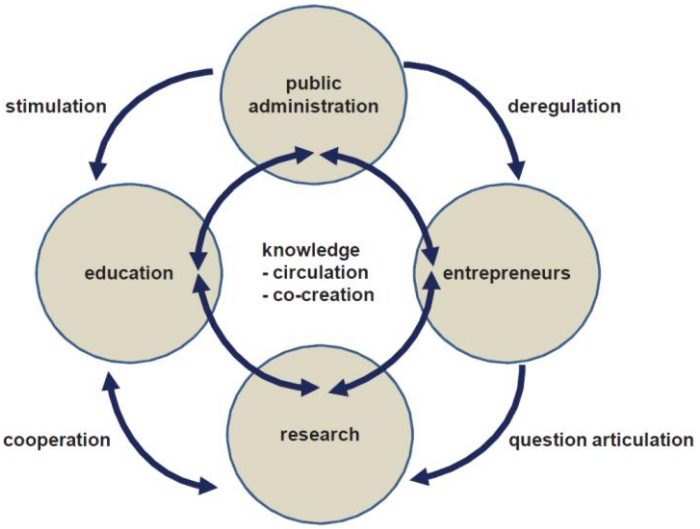

Figure 5. Relationship between actors in the green knowledge system (derived from Kupper et al., 2012, p. 134).

In the literature, specific collaboration drivers and barriers are appointed regarding the collaboration between green MBO/HBO education and entrepreneurs within the green sector are hard to find. Therefore, table 5 is composed, that shows the possible benefits (which can act as collaboration driver) and negative elements (which can act as collaboration barrier) of other profit/non-profit collaborations, i.e. social and industry/university collaboration: this table may give an indication for possible drivers and barriers in case of collaboration between green MBO/HBO and green sector entrepreneurs, as this collaboration is also a form of profit/non-profit collaboration.

Table 5. Characteristics of profit/non-profit collaborations.

	Type of profit/non-profit collaboration	
Characteristics	**Social collaboration**	**Industry/university collaboration**
Variations in relationship	- Corporate philanthropy, corporate foundations, licensing agreements, sponsorships, transaction-based promotions, cause related marketing, joint issue promotion and joint ventures (Samu & Wymer, 2001; Wymer & Samu, 2003).	- (Joint research) collaboration, 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 business), and training (postgraduate training in business or training of company employees) (D'Este & Patel, 2007). - Joint publications, joint supervision of Ph.D. and masters theses, mobility of researchers between universities and businesses, lectures from business members at universities, use of university facilities by businesses, licensing of university patents by businesses, purchase of prototypes (developed at universities), reading of publications, patents etc. (Schartinger et al., 2002).
Positive collaboration elements (potential drivers) for profits	- Positive contribution to the business' CSR activities (Eweje & Palakshappa, 2009). - Increase in the business' sales, support for furthering the business' objectives, and contribution to attaining a more positive image among the business' customers (Samu & Wymer, 2001).	- Changing nature of global business, increasing need for product and process innovation (Elmuti et al., 2005), (rising) global competitiveness (Santoro & Betts, 2002; Elmuti et al., 2005). - New products, patents, hiring students, and establishing new enterprises (Cyert & Goodman, 1997). - Knowledge transfer activities, technology transfer programs, efficient staff training programs, lower R&D expenditure (Elmuti et al., 2005). - Developing and commercialising new technologies (Parkhe, 1993), generating knowledge (Santoro & Betts, 2002), engaging in 'open innovation' (Chesbrough et al., 2006), using research results to solve business problems (Lee, 1998). - Access to complementary expertise, knowledge and resources which are unavailable within the business' community (Santoro & Betts, 2002).
Positive collaboration elements (potential drivers) for non-profits	- Gaining another source of funding to increase contributions (Austin, 2000; Sagawa & Segal, 2000; Eweje & Palakshappa, 2009). - Reaching a broader market and increase awareness (Wymer & Samu, 2003), credibility and recognition (Samu & Wymer, 2001). - Additional financial resources, services or goods, access to other businesses, technology and expertise and new perspectives (Austin, 2000).	- New products, publications, patents, trained students, new research agenda, new curricula, better methods to educate students, and established new enterprises (Cyert & Goodman, 1997). - Receiving research funding, the opportunity for students to learn from "real" business situations (Elmuti et al., 2005). - Creating valuable IP to foster technology transfer (Bruneel et al., 2010). - Increasing access to new research tools, accelerated product development, increasing access to industry's IP (Welsh et al., 2008).
Negative collaboration	- Reputational risk (Austin, 2000; Wymer & Samu, 2003). - Differences in culture, goals, objectives as well as unequal learning	Both parties: - Direction of the research/collaboration does not match the university's

elements (potential barriers)	or partner asymmetries (Eweje & Palakshappa, 2009). - Potential risk of loss of sales or market share, and shareholder and employee resentment (Wymer & Samu, 2003).	publication requirements or is of sufficient academic value, and/or does not match the business' requirements. - Different working cultures, languages, values (Kock et al., 2000), objectives and perception on goal achievement (Elmuti et al., 2005). - Institutional norms that govern public and private knowledge (Dasgupta & David, 1994). - Uncertainty, mutual lack of understanding about expectations and working practices, conflicts on research topics, types of outputs, and/or the timing and form of disclosure of research results (Bruneel et al., 2010). Profit: - Possibility on conflicting research results with the business' claims, disclosure of research provides insights for other businesses (Santoro & Betts, 2002). - The university's attempt to obtain the commercial benefits from research, the university's research orientation towards pure science, the university's long-term research orientation, conflicts with the university regarding royalty payments from patents or other IP rights, absence or low profile of industrial liaison offices in the university, and concerns about confidentiality, rules and regulations imposed by universities or government funding agencies (Bruneel et al., 2010). Non-profit: - Affecting the university's principal mission and responsibility by the expectation to grant exclusive rights to businesses by the university (Santoro & Betts, 2002). - Tendency of industrial liaison offices to oversell research or have unrealistic expectations (Bruneel et al., 2010). - The collaboration has not a positive impact on the knowledge within the faculty's discipline, current literature and/or educational program (Tucker et al., 2003).
Success factors	- Having the right partners, partners independence, coincidence of values, having a skilled convenor, organized decision-making, environmental fit (Eweje & Palakshappa, 2009). - Focused attention, communication, organizational system, mutual expectations and accountability, trust, alignment of strategy, mission and values, personal connection and relationships, value generation and shared visioning, continual learning (Austin, 2000). - Partner's target market, perceived similarities (Andreasen, 1996). - Reputation, commitment, top management interest, employee attitude (Samu & Wymer, 2001).	- Working across organizational boundaries, develop operating routines an practices to manage the collaboration (Bruneel et al., 2010). - Discussing expectations and potential unforeseen situations (Santoro & Betts, 2002). - Trust (Santoro & Saparito, 2003): interorganizational trust is a strong factor for diminishing collaboration barriers, and trust can be constructed by long-term investment in interactions, mutual understanding about different incentive systems and goals and face-to-face contacts (involving multiple interaction channels and personal and professional relationships) (Bruneel et al., 2010).

The elements in table 5 may not all be applicable in case of collaboration between green MBO/HBO education and green sector entrepreneurs, however, some may also be imaginable for this type of profit/non-profit collaboration. For example, as mentioned in case of industry/university collaborations, possible conflicts between MBO/HBO and entrepreneurs may arise due to the difference in nature of both parties as well as the difference in mission and goals etc.

However, regardless the type of collaboration (an) educational institute(s) and business(es) engage in, there is no doubt that the collaboration will be a complex challenge due to differences in interests and needs as well as varying (economically dependent) opportunities (Mulder, 2010). Also, as Perkmann & Walsh (2007) argue, there are differences in relationships between industry and education across industries and (scientific) disciplines. Moreover, it is more likely that faculties or educational institutes that specialise in applied sciences will have relationships with businesses than less applied sciences, since the nature of the education allows a direct application in practice (Tucker et al., 2003).

5. METHODOLOGY

This chapter describes the methodology that is used throughout the research project. First is the research framework illustrated in section 5.1. Section 5.2 describes the methodology for elaborating the literature research.

5.1 RESEARCH FRAMEWORK

The research framework (figure 6) presents the fields of subjects on which the literature research was focused.

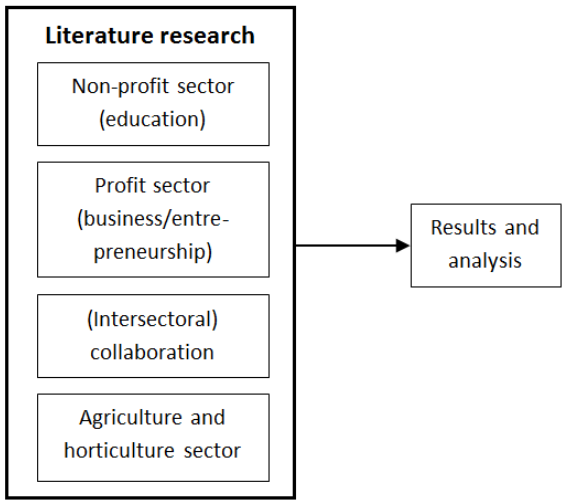

Figure 6. Research framework (derived from research proposal, October 2012)

Several subjects are involved within the research project: the profit and non-profit sector, collaboration between these two sectors and the collaboration between green MBO/HBO education (as non-profit sector) and entrepreneurs within the green sector (as profit sector). It appeared that literature on the latter mentioned subject is very limited. Therefore, literature on other types of profit/non-profit collaboration is included to generate information on drivers and barriers for collaboration between two different sectors.

5.2 LITERATURE RESEARCH

The literature research consists of the analysis of relevant literature that is available on the research subject. Relevant literature is derived from different sources: books, scientific articles, reports and websites. The scientific articles are found through entering search commands at Web of Science and Google Scholar. The search commands are composed by using key words from the research subject and by deriving possible interesting references from gathered literature.

6. CONCLUSIONS AND DISCUSSION

This chapter illustrates the conclusions of the results from the literature research. The research questions, which are introduced in section 3.4, are answered in this chapter.

6.1 SPECIFIC RESEARCH QUESTIONS

Section 3.2 presented the research objective, i.e. the goal of the research project. The primary goal is:

Yield literature research results for green education and businesses in the agriculture and horticulture sector on the conditions for participation of businesses in education and vice versa.

This primary goal is divided in the following sub-goals:

- Identification of the characteristics of the non-profit sector and businesses (profit sector).
- Identification of the drivers and barriers for collaboration between the non-profit sector and businesses.
- Identification of the drivers and barriers for collaboration between green education and businesses in the agriculture and horticulture sector.

The research objective has led to a general research question and also several specific research questions, which will be answered in section 6.1 and 6.2 respectively (the answers to the specific research questions will lead to answering the general research question).

1. WHAT ARE THE CHARACTERISTICS OF A NON-PROFIT SECTOR AND A PROFIT SECTOR?

The characteristics of organizations in a profit sector differ from organizations in a non-profit sector regarding the vision, objectives, cultures, operating styles, motivation, scope of impact, performance expectations, strategic constraints, ownership and responsibility, markets financial constraints, revenues, and incentives. For example, non-profit organizations have an extensive social responsibility and complicated restrictions on strategic and financial actions, and are considerably more risk-averse than profit organizations. The latter characteristic causes non-profit organizations to be further away from the innovation path than profit organizations. Moreover, in case of an alliance, a profit organization expect all partners to provide value, while a non-profit organization expects a business to help with its mission.

Looking specifically at education institutes as non-profit organizations, there are specific characteristics which makes these organizations distinct from profit organizations. These characteristics concern the knowledge system as well as the goals, philosophies, missions, and reward systems related to IP rights, patent ownership and licensing.

2. WHAT ARE DRIVERS AND BARRIERS FOR COLLABORATION BETWEEN A NON-PROFIT SECTOR AND A PROFIT SECTOR?

Social collaboration and industry/university collaboration are both included for investigating the drivers and barriers for profit/non-profit collaboration. This resulted in numerous factors that may be a potential driver or barrier. Examples of some potential collaboration drivers for non-profit organizations are: additional financial resources, services or goods, creating of and/or access to (new) technology, knowledge and products, opportunity for students to learn from “real” business

situations, and creating IP. For profit organizations, potential collaboration drivers can for example be: need for product and/or process innovation, knowledge and/or technology transfer, using research results to solve business problems, staff training programs, and hiring students.

Collaboration barriers may include the differences in culture, goals, objectives, languages and values, conflicts on research topics, types of outputs, the timing and form of disclosure of research results, and differences between the direction of the collaboration and the requirements of the involved collaboration parties.

3. How can collaboration be promoted between green education and entrepreneurs in the agriculture and horticulture sector?

The literature research shows that collaboration between two parties can be deployed when both parties aim to achieve mutual goals (possibly next to achieving also individual goals): the collaborative effort should enable the collaborating parties to achieve certain short and/or long-term goals which may not be achieved when the parties act independently. Therefore, mutual goals should be defined by green education institutes and entrepreneurs within the green sector, in case of collaboration. Looking at the described issues within the Dutch green sector and green education, some mutual goals can already be identified. For example, both education and entrepreneurs benefit from qualified, competent graduates. Close cooperation should be deployed between education and entrepreneurs, to work efficiently and effectively towards this mutual objective, i.e. an educational program that makes students better qualified and more competent. A possible application of such a collaboration may be the implementation of a course like Academic Consultancy Training (ACT, developed and implemented by Wageningen University).

Collaboration between green education and green sector entrepreneurs can thus be promoted by the identification of the collaboration benefits for both parties, which result from achieving mutual goals. These benefits should evidently be of greater value than the expected effort and/or costs that each party invests. Other factors like trust, commitment and communication seem to play an important role within collaborations in general, and should therefore be taken into account.

6.2 General research question and discussion of the results

This section provides an answer to the general research question, which is formulated as follows:
What are the drivers and barriers for collaboration between a non-profit sector ("green education") and businesses (entrepreneurs within the agriculture and horticulture sector)?

Obviously, collaboration is attractive for green education and green sector entrepreneurs when both parties gain benefits out of the collaboration, which are greater than the invested effort and/or financial means. For green educational institutes, the benefits from such a collaboration may concern gaining insights into current business problems, developments and challenges. Practical business situations can bring students as well as teachers up to date, and may offer interesting educational assignments. For green sector entrepreneurs, possible benefits can be derived from collaboration with green educational institutes in the field of exchanging knowledge and technologies, for improving their products and/or processes (and/or creating new products or processes). Also, students can give another perspective on how to solve business problems, and/or face current or future developments and challenges. The implementation of a course like ACT in green MBO/HBO

education may give both green MBO/HBO institutes and green sector entrepreneurs the motivation to collaborate.

Due to the knowledge intensive character of the green sector, it is from a theoretical point of view indispensable for MBO/HBO institutes and green sector entrepreneurs to work closely together for mutual interesting goals. A collaboration will provide both parties the possibility to create and have access to (new) knowledge, technologies, processes and products.

Since literature on collaboration drivers and barriers between green MBO/HBO and entrepreneurs within the green sector specifically is hard to find, other types of profit/non-profit collaboration are studied which may provide insights for collaboration between MBO/HBO and entrepreneurs. However, it may be possible that results from the study on social and industry/university collaborations are not applicable to collaborations between green MBO/HBO and entrepreneurs in the green sector. This may be due to differences regarding MBO/HBO versus university, entrepreneurs versus industry, education versus 'charity-like' organizations, collaboration in the Netherlands versus collaboration in other countries, and/or the type of sector (the green sector versus other sectors). For example, MBO/HBO education is not research driven, like an university. This lead to the inapplicability of some features of the described industry/university collaborations.

Empirical research on collaboration between green MBO/HBO and entrepreneurs within the green sector should make the identification of collaboration drivers and barriers possible. Therefore, future research is needed to explore these specific collaboration drivers and barriers.

Notes

1. The study of Bruneel et al. (2010) consists of a statistical analysis of a large survey of businesses that are engaged in industry/university collaborations. However, the results should be taken with 'caution' since the sample is of businesses in the UK, the research projects are publicly funded and over 40% of the sample are service firms (the other part of businesses in the sample operate in chemical(-related) sectors, machinery and metal, electronics and instruments, transport, utilities and construction, or are categorized as 'other sectors'; the study is focused on the industrial sector).

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APPENDICES

Appendix I Abbreviations and definition of concepts

Appendix II Additions to chapter 4

APPENDIX I ABBREVIATIONS AND DEFINITION OF CONCEPTS

Competence	"The integrated set of capabilities (or competencies) consisting of clusters of knowledge, skills, and attitudes necessarily conditional for task performance and problem solving and for being able to function effectively (according to certain expectations or standards); and in a certain profession, organisation, job, role and situation" (Mulder et al., 2009).
CSR	Corporate Social Responsibility.
Dutch ministries	Ministry which focuses on green education, from the most recent cabinet formation to least recent: Rutte II: Ministry of Economic Affairs (Ministerie van Economische Zaken). Rutte I: Ministry of Economic Affairs, Agriculture and Innovation (Ministerie van Economische Zaken, Landbouw en Innovatie). Balkenende IV and III: Ministry of Agriculture, Nature and Food Quality (Ministerie van Landbouw, Natuur en Voedselkwaliteit). Earlier: Ministry of Agriculture, Nature Management and Fisheries (Ministerie van Landbouw, Natuurbeheer en Visserij).
HAVO	Hoger Algemeen Voortgezet Onderwijs: senior secondary education (Kupper et al., 2012).
HBO	Hoger BeroepsOnderwijs: higher professional education (Kupper et al., 2012).
IP	Intellectual Property.
Knowledge configurations	"New, innovative, arrangements between education, businesses, industries, research and development" (Wals et al., 2012, p. 6).
LTO	Land- en Tuinbouw Organisatie Nederland.
MBO	Middelbaar BeroepsOnderwijs: vocational education (Kupper et al., 2012) or senior secondary education (Mulder, 2010).
R&D	Research & Development.
VET	Vocational Education and Training (Wals et al., 2012).
VMBO	Voorbereidend Middelbaar BeroepsOnderwijs: junior secondary education (Kupper et al., 2012).
VWO	Voorbereidend Wetenschappelijk Onderwijs: pre-university education (Kupper et al., 2012).
WO	Wetenschappelijk Onderwijs: academic education (Kupper et al., 2012).

APPENDIX II ADDITIONS TO CHAPTER 4

II a. Industry/university relationships

Table 6. Characteristics of industry/university relationships, according to university scientists (derived from Welsh et al., 2008, p. 1858).

Characteristic of UIR	Mean	Std. Dev.
Provides new research funds	6.0	0.9
Increases access to new research tools	5.7	1.2
Provides new support for graduate students/postdocs	5.6	1.2
Provides contact with a wider network of scientists	5.5	1.5
Accelerates product development	5.4	1.2
Increases access to new knowledge	5.0	1.7
Increases potential for tension with university conflict of interest policies	4.9	1.6
Restricts scientific communication among university researchers	4.6	1.5
Inhibits materials transfer	4.5	1.8
Increases access to industry's intellectual property	4.5	1.7
Elevates university's prestige	4.4	1.6
De-emphasizes non-proprietary agendas	4.1	1.6
Increases lawsuits over intellectual property	4.1	1.6
De-emphasizes basic science research	4.0	1.7
Undermines the credibility of university scientists	3.9	2.0
Limits or restricts faculty members' ability to publish	3.7	1.7
Limits or restricts students' ability to publish	3.6	1.8
Increases tensions between university colleagues	3.5	1.7

II b. ACT course outcomes and activities

Table 7. ACT course outcomes and activities (Mulder, 2010)

ACT outcomes	ACT activities
▪ Definition of the project goals. ▪ Making a project plan. ▪ Developing a work breakdown structure. ▪ Client-consulting communication (refining and revising project goals and plan). ▪ Presenting and defending results. ▪ Work in an interdisciplinary team. ▪ Delivering (intermediate) project results. ▪ Reflecting on experience, team members' performance as well as self-reflection on own performance.	▪ Team meetings. ▪ Meetings with the commissioner. ▪ Development of the work plan. ▪ Executing project activities. ▪ Creating project deliverables. ▪ Composing a performance portfolio. ▪ Additional skills training. - Project planning. - Work plan development. - Communication. - Group dynamics. - Self-reflection. - Team building. - Multicultural communication.