The impact of industrial sponsorship on students, academia and industry

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The impact of industrial sponsorship on students, academia and industry

by

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A doctoral thesis submitted in partial fulfilment of the requirement for the award of doctor of philosophy of Loughborough University

April 2010

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Abstract

This thesis reports a research study to measure the impact of industrial sponsorship on student, academia, and industry. The thesis provides a review of the literature in the field of engineering education, university-industry collaboration and student sponsorship. It describes the design of the study and methods of data collection and data analysis. It then presents a discussion of the impact of sponsorship.

The research project was conducted at Loughborough University from 2006 – 2009. It has captured existing practice across sponsored and non-sponsored programmes within the Engineering Faculty at Loughborough University together with a small number of national and international sponsorship schemes. Data were collected from the undergraduate engineering students, graduates, sponsoring/non sponsoring companies, and the academic staff of engineering departments using questionnaires, interviews and documentary analysis.

This study highlights the values and issues of the relationship between employers and students during their undergraduate study from the perspective of students, employers and academic staff. It takes a mixed-method approach to assess the attitudes and perception of individuals from these parties and identify the barriers which limit further engagement in order to propose guidelines for further improvements.

The results show that the majority of the stakeholders valued industrial sponsorship as a way of developing the quality of undergraduate degrees and generating enough of the high quality engineers that the industry needs. There was close agreement on these matters between the parties involved. Overall the findings of the research showed that the parties’ main expectations of sponsorship schemes were largely met by the reality of sponsorship.

Greater awareness of the details of sponsorship schemes, including how they work and what is involved, would make employers more likely to offer sponsorship and encourage more students to apply for sponsorship.

Conclusions are drawn on the benefits that sponsorship offers, the incentives for these stakeholders, the role of sponsorship in building a relationship between students and their future employers, its contribution to the attainment of learning outcomes, the degree of sponsorship attractiveness to the investigated companies, the obstructions which limit partnership and recommendations for further developments.

**Keywords:** employability, engineering education, industrial placements, industrial sponsorship, skills, and university-industry collaboration.
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Chapter 1: Introduction

1.1 Overview

Over the coming years, the importance of technical and professional skills will increase and industry will need a highly skilled workforce to succeed in the new global economy. In fact, “in today’s fast changing world we can be a winner in the “race to the top”, but only if we run fast” (Lord Sainsbury, 2007). This is true for both the public and private sectors of any size. They need engineers who are professionals and leaders of world-class standing and can perform in a complex business environment to guide the industry to a successful future. This highlights the role of engineers in society and developing a successful economy (Leitch, 2006; Robinson et al., 2007; BIS, 2009).

Although there has been a reduction in demand in the current recession, it has been widely reported that the UK has been facing an increasing shortage of high quality engineers entering industry. A number of employers have identified skills gaps in specific technical and general skills in the graduates they recruit. In addition to this, the rate of producing new generations of engineers is failing to cope with the changing demands of employment. In fact, between 1994-2004, the number of engineering degree students in UK universities remained at 24,500 each year and after completing their studies less than half of them choose to enter engineering employment. It is estimated that China and India alone have around half a million engineering graduates each year (The Royal Academy of Engineering, 2007).

Action needs to be taken to avoid crucial impacts on the productivity and creativity of UK businesses. Universities need to attract more students and university programmes must recognise the changing requirements of industry and provide students with practical skills to work effectively in industry on graduation (The Royal Academy of Engineering, 2007).
This indicates the need for a more ‘professional’ higher education with a stronger focus on key skills and strong links with industry. It has become clear that it is necessary for academics and industry to collaborate to bring about essential improvement and mutual benefits. Industry also needs to invest in areas such as education and innovation to remain competitive (Department for Education and Skills, 2003; Leitch, 2006; The Royal Academy of Engineering, 2007; BIS, 2009).

In recent years, there has been development across the United Kingdom in the relationship between higher education and industry. Research collaboration, consultancy services and industry’s growing involvement as an interactive user of all types of teaching and training are parts of these linkages (Howells et al., 1998; Lord Sainsbury, 2007).

Industrial relationships provide the opportunities for sharing ideas in teaching and collaboration in research. They can help to ensure that graduates have the required skills and that they are ready to contribute to the organisations that employed them. Successful collaborations have extensive rewards to all the parties, in addition to the benefits generated for the economy from technology transfer (Dickens, 2006; Leitch, 2006; The Royal Academy of Engineering, 2007).

The Lambert Review showed that companies are considerably more successful if they use universities and other higher education institutions as a source of information or as a partner (Lambert, 2003). Also, a government white paper ‘The Future of Higher Education’ identified closer relationships between employers and academics as a critical factor to prepare new employees and for continuous professional development (Department for Education and Skills, 2003).

The sponsorship of engineering students is a successful example of university-industry collaboration which can be an effective way of enhancing the development of the students’ key engineering skills. It enables employers to maintain a close relationship with students and university departments as they will be involved in the education and initial training of engineers (Gordon et al., 1985a).
Although there is some sponsorship in the pure sciences and in business and commercial subjects, sponsorship in engineering is most common (The Royal Academy of Engineering, 2003).

1.2 An outline of Industry input to programmes at Loughborough University

Loughborough University has always had strong links with industry. Working closely with industry in both teaching and research is embedded in the university strategic plans and most undergraduate engineering programmes offer a twelve month industry placement (sandwich year) to students. The university is one of the largest provider engineering sandwich placements in the UK in partnership with many leading engineering companies.

Also, a large number of the undergraduate students are sponsored by industry. In the departments of Civil and Building Engineering, Electronic and Electrical Engineering, and Mechanical and Manufacturing Engineering consortiums of companies are involved sponsoring students on the MEng Civil Engineering, BSc Construction Engineering Management (CEM), BSc Commercial Management and Quantity Surveying (CMQS), Systems Engineering, and Innovative Manufacturing Engineering (IME) degrees.

The companies sponsor both the programmes and the students on the programmes. These programmes have been developed in direct response to a range of needs of industry. The sponsors play an active role in the development of curriculum and delivery of the courses and the course content provides many modules covering aspects of the profession (Higher Education Academy Engineering Subject Centre, 2009).

Through sponsorship, the sponsors provide students with a bursary, maintain contact with them during their studies, provide vacation work and sandwich placements. In general, graduate employment follows but this is not guaranteed, or always wanted by graduates. However, there is a general expectation on both sides that permanent employment will follow graduation.
There are annual meetings with consortium companies to discuss issues relating to the programmes including student progress and new applicants. Identifying programme content, providing teaching material, and providing guest speakers are some of the other inputs to the curriculum. Including more employers and expansion of the schemes to other programmes are the anticipated future developments of the schemes.

This study is one of the research projects in the Engineering Centre for Excellence in Teaching and Learning. The engCETL at Loughborough University was set up in March 2005 and focuses on industry and education collaboration and links with seven departments including Civil and Building Engineering. The CETL aims to collect evidence and ensure sustainable engagement by building models of practice that maximize the benefit for all parties.

1.3 Aims and objectives

Sponsoring engineering degree programmes has been seen as a productive link between industry and university in learning and teaching. However, university-industry collaborations in the form of sponsorship are still relatively rare in many engineering fields. There is a lack of understanding of the issues involved in both academia and industry. It is clear that work needs to be done to identify the views on sponsorship of both partners and based on these provide recommendations to develop the sponsorship schemes in the way that their expectations are met and their benefits are maximised. Therefore, this research was carried out to answer the following question:

“*What is the impact of industrial sponsorship on students, academia, and industry?*”

This research explored the following areas in order to answer the above question: the benefits from sponsorship to the parties involved, the incentives for these parties, attractiveness of sponsorship to them, the impact of sponsorship on the student’s employability, the curriculum, and programme quality, and the barriers that stop more departments and companies offering sponsored programmes.
The objectives of this study were to determine:

- incentives of involvement in sponsorship,
- advantages and disadvantages of the sponsorship schemes, and
- barriers that limit further collaboration.

The aim of this study was to develop a sustainable model of effective practice in a form of a series of guidelines and practices that could provide ‘best practice’ for further dissemination. Figure 1-1 presents a synopsis of the project.

1.4 An overview of the work done

The research captured existing practice across the sponsored and non-sponsored programmes within the Engineering Faculty at Loughborough University plus other schemes such as the ICE QUEST, the AutoCRC scheme, and the SUCCESS scheme (see section 2.2.6.2 for full details about the schemes).

Data was collected from students, academia, and industry to create a wider range of information and provide a snapshot of their expectations.

The different views of the stakeholders were used for measuring the impact. In addition to that, academic performance of the sponsored students and their employability (compared with the performance and employability of the non sponsored students) were also provided evidence of the impact of sponsorship.

These views obtained from a wide variety of quantitative and qualitative approaches. Questionnaires regarding sponsorship issues were designed and sent out to the undergraduate engineering students and recent graduates and interviews were carried out with the employers and the academic staff.

All the data was then analysed to evaluate the benefits to the three stakeholders, assess the barriers that inhibit further sponsorship, and propose strategies for future developments, and to draw conclusions related to the objectives of the study. Overall, the statistical results and descriptive representations generated from this study provide
Figure 1-1: Project in a glance
resources for improving input of industry into engineering education by drawing our attention to benefits from sponsorship and areas that need to be improved.

1.5 Outline of the chapters

The aim is that to have each chapter stand alone and for this reason some information such as the research aim and the participated groups have been repeated in some sections to aid clarity. This section gives a brief description of each chapter within the thesis. Figure 1-2 shows the interrelationship of chapters.

Chapter 1 – Introduction: this chapter provides the background, the research question and the reasons for undertaking this research. It highlights the main aims and objectives of the research. Additionally the chapter gives an overview of the targeted population and the work done during the research.

Chapter 2 – Literature Review: this chapter provides a review of the literature with regards to the subject area. The review initially covers a large variety of literature on the engineering education and the impact of university-industry collaboration on students, academics, and employers. It then concentrates more on sponsorship.

Chapter 3 – Research design and methodology: this chapter contains the actions taken to gather the data in order to answer the research question and highlights the research methods of data collection and analysis used during the study and the reasoning behind the choice of these methods.

Chapters 4, 5, and 6 – Results analysis: Chapter 4 reports the student data, Chapter 5 reports the academic staff data, and Chapter 6 reports the employers’ data. These chapters summarise, evaluate and analyse the results obtained from the questionnaire survey, interviews and documentary analysis that were conducted during the study. The trends and discrepancies between the results and the literature review are highlighted.

Chapter 7 – Discussion: this chapter represents together the findings of the investigations and compares the views of the students, academics, and employers on the impact of
sponsorship and links them back to the literature in Chapter 2. It then presents the findings in the form of a series of guidelines.

Chapter 8 – Conclusions and future work: In addition this chapter presents the conclusions that can be drawn from the evidence presented in this thesis, presents a model of practice that maximizes the benefit for all parties, indicates the limitations of the research and factors that need to be taken into consideration when reading the findings, and offers suggestions for further research in this area.

The students and graduates’ questionnaires, the academic staff and the employers’ interview template, and postgraduate research student skills training record are presented in appendices.
Chapter 1: Introduction

Research question: What is the impact of industrial sponsorship on students, academia and industry?

Chapter 2: Literature Review

Chapter 3: Methodology

Chapter 4: Student study
- influence of sponsorship availability on students' choice
- reasons for applying for sponsorship
- advantages and disadvantages of sponsorship
- reasons for not applying for sponsorship
- rooms for improvement

Chapter 5: Academia study
- reasons for offering sponsorship
- advantages and disadvantages of sponsorship
- barriers that limit further collaboration
- rooms for improvement

Chapter 6: Industry study
- incentives of involvement in sponsorship
- advantages and disadvantages of sponsorship
- barriers that limit further collaboration
- rooms for improvement

Chapter 7: Discussions
- What are the benefits derived from sponsorship?
- What are the incentives for these stakeholders?
- What impact does sponsorship have on student employability?
- What is the role of sponsorship in building a relationship between students and employers?
- How does industrial sponsorship influence learning outcomes of degree programmes?
- Is there a link between influence on the curriculum and student employability?
- What is the degree of sponsorship attractiveness to the investigated companies?
- Why do not all students apply for sponsorship when it is available?
- What are the factors that prevent more departments offering sponsored programmes?

Chapter 8: Conclusions, the proposed model and future work

Figure 1-2: The interrelationship of chapters
Chapter 2: Literature Review

This chapter provides a review of the relevant literature in the field of University-Industry (U-I) links, engineering education, and research strategy. It explains the strengths and weaknesses of University-Industry links in general and focuses on the U-I links in form of sponsoring undergraduate students during their degree studies. It also provides the reviews on workplace learning, skills demanded by industry and recommendations for improving U-I links. It then describes learning theories and styles that generally used in educational circles. Finally, this chapter explains the basis of impact and the importance of measuring impact.

2.1 University-Industry links

2.1.1 Introduction

Traditionally there was a distinction between university and industry. While university has been considered as the place of education and research, industry was the centre of innovation (Ojewale et al., 2001). However, industry and universities should move with the times. With the current tendency, it has become clear that it is necessary for academics and industry to collaborate to bring about essential improvement and mutual benefits (Taylor, 2001; Chadha, 2006; The Royal Academy of Engineering, 2007).

Industry faces increased skills needs to succeed in the new global economy and graduate employment is a part of firms’ success of any size. The need for universities to meet the needs of industry has been recognised for some time (Confederation of British Industry, 1966). The universities have been reviewing their policies and functions to see what is required by industry and supply the trained men and women that industry needs to survive. At the same time, employers need to increase their investment in skills (Hughes, 2006; Leitch, 2006; CBI, 2009b). Rick Trainor (CBI, 2009b) emphasises that:
“The investment is worthwhile, because we know that graduates at their best, with the right mix of skills, can have a transformative effect on the places in where they work.”

Engineering, most likely more than any other scientific discipline, has a long practice of collaboration between academia and industry. It should be noted that industry is an engineering department’s main client, after students, and universities need to recognise this and express their importance to industry. Successful relationships have wide rewards to both parties in addition to the benefits generated for economy from technology transfer (The Royal Academy of Engineering, 2007).

University-industry collaboration has ranged from informal personal links, for example in Japan to virtually every type of university-industry collaboration in the United States. British universities have made a real improvement in their attempts to work with industry in contrast with higher education institutions in other European countries (Confederation of British Industry, 1966; Lambert, 2003; Hughes, 2006).

2.1.2 University-Industry links: historical background

University-industry collaboration arose in the nineteenth century, when Joseph Whitworth created the Whitworth scholarship and gave his comment:

“… The hope that means may be found for bringing science and industry into closer relationship with each other than at present obtains in this country” (Science Research Council Engineering Board, 1975).

In the mid and late nineteenth century, ‘redbrick’ universities were established in the industrial heartlands of Britain, Manchester being a leading example (Howells, Nedeva, & Georghiou, 1998). These universities were founded on the principle of industry and academia links for scientific and technical development but also for the benefit of the local industry and economy. Providing professionally educated employees was the basic duty of British universities and, later, such opinion led to the formation of the polytechnic system within the UK to supply the skill and technical requirements of British industry. Co-operative Awards in Science and Engineering (CASE) studentships, the Teaching
Company Scheme, and Integrated Engineering course are examples of cases, designed to support industrially relevant training (Payne et al., 1993; Howells, Nedeva, & Georghiou, 1998).

In recent years, there has been an increasing development in the relationship between higher education and industry across the United Kingdom. However, this progress has not followed a single or direct way, but is the outline of a wide variety of projects at every level. As Halsey stated:

“British higher education has undergone a more profound reorientation than any other system in the industrialised world” Cited in (Howells, Nedeva, & Georghiou, 1998).

2.1.3 University-Industry links: Why?

University-Industry (U-I) links represent a developing movement for progressing knowledge and new technologies (Santoro and Chakrabarti, 2002). Higher education institutions, during the last decade, have been facing major changes in relation to their roles and responsibilities in national systems of innovation (Howells, Nedeva, & Georghiou, 1998). The need for stronger links between industry and higher education in the UK has been urged by various national reports such as (Roberts, 2002; Department for Education and Skills, 2003; Leitch, 2006; The Royal Academy of Engineering, 2007; Robinson, Bramhall, & Rowe, 2007; BIS, 2009; CBI, 2009b).

A successful U-I collaboration benefits all involved parties, in addition to the benefits generated for the UK economy from technology transfer. In the UK, public spending on the teaching of students in higher education is over £3bn per annum. Knowledge and skills transfer between universities and business and the wider community increases the economic and social returns from this investment (Lambert, 2003).

In the literatures, the following benefits of U-I links to industry, university, and students have been mentioned (Wood, 1983; Santoro & Chakrabarti, 2002; Lambert, 2003; The Royal Academy of Engineering, 2007; Tynjälä, 2008):
The gains to industry are:

- useful ideas,
- access to highly trained students,
- alternative method of recruitment, and
- enhanced reputation.

The benefits to the university are:

- useful ideas,
- up to date practical information,
- improvement in the quality of teaching,
- access to applied technological case studies,
- improved reputation and status with industry and the community, and
- employment opportunities for their graduates.

The benefits to students are:

- preparing for the world of work,
- gaining work placement opportunities,
- gaining skills,
- gaining extra funding,
- finding a satisfying career,
- accessing new technology, and
- encouraging their engagement.

This research investigates how the U-I links in the form of sponsoring undergraduate students during their degree studies impact on achieving these benefits.

2.1.4 University-Industry links: How?

While there are many links between Higher Education Institutions (HEIs) and industry in the UK, progress in establishing more productive links has been slow and there are potential to improve HEIs engagement especially with the small and medium-sized firms. Though different cultures and missions make companies and universities unnatural
partners, who may have different views of partnership and it is still difficult for the parties to work together (Wood, 1983; Lambert, 2003; Tynjälä, 2008; CBI, 2009b).

The following factors have been criticised by many industrialists and academics as barriers that limit further collaboration (Wood, 1983; Santoro & Chakrabarti, 2002; Lambert, 2003; The Royal Academy of Engineering, 2003):

- management and organizational issues,
- poor communication,
- mutual mistrust between the partners,
- misunderstanding of each other’s needs,
- aligning of the expectations and objectives of the collaborating university and company,
- lack of time,
- lack of follow up, and
- concerns over reputation of science and engineering as unattractive and unrewarding careers.

However, industries, universities, and the economy as a whole will be benefited by: encouraging, improving, and facilitating communications; identifying the benefits of industry involvement; and developing a more trusting approach by all those involved. Government and public sector bodies should therefore, encourage and support collaboration between HEIs and industry by providing practical encouragement to each partner and facilitating co-operation (Wood, 1983; Roberts, 2002; Lambert, 2003; Lord Sainsbury, 2007).

### 2.2 Engineering education

#### 2.2.1 Introduction

As industry plans to meet the technical challenges of the 21st century, there is a need to focus on the people who are the most important part of the industrial systems. Engineers need technical knowledge and skills, and the ability to apply their knowledge. They need
to be able to work individually and in teams. Engineering education involves the development of critical thinking and problem solving abilities in students. Engineering education organisations should enhance the learning experience of students and provide an environment to prepare the students to obtain the knowledge of facts (knowing what) and the skills (knowing how) for lifelong learning (Baillie et al., 2001; Szabo and Karacal, 2009).

In fact, undergraduate education is the point of departure from which engineering graduates either enter in the world of work or continue their studies through postgraduate courses. Therefore, academic staff should play a key role in preparing the graduate for the 21st century and students must know the way the world around them works and be able to contribute to the society responsibly (Badiru, 1996; Roberts, 2002; CBI, 2009b).

Engineering is about the application of scientific knowledge in a business context to produce an economic output. Today, the business world more and more requires engineers who can design and deliver products and complete solutions relating to complex systems. Engineers also require the ability to work in globally distributed teams across different cultures (Higher Education Academy Engineering Subject Centre, 2005; The Royal Academy of Engineering, 2007). However, in the last decade, higher education has faced new challenges such as sustainable development and a debate has arisen on whether enough engineers are being trained, and whether they receive relevant training (Gordon et al., 1985b; Bowen et al., 2007).

The Lambert Review (2003) reported that there is a mismatch between the industry requirements and university courses in particular areas. University programmes must recognise the real and continuously growing requirements of industry and develop in line with these requirements, attract and maintain the inspiration of students, and provide students with practical and novel problem-solving skills to work effectively in industry on graduation (The Royal Academy of Engineering, 2007). Vaughan Burnand, director at Constructing Excellence, has stated (Construction News, 2009):
“... I hope we open our eyes and innovate for the intake and offer them a variety of opportunities at all levels so that they get essential experience if only to see whether they like the industry...”

Effective links between industry and university engineering departments could support the combination of theoretical knowledge and industrial practice in universities programmes and provide the opportunity for universities to recognise the changing requirements of industry.

The CBI report (2009b) cited Anne Duncan, who is a marine engineering company Yellowfin Limited’s chief executive and believes even small companies can make a difference to students’ understanding of the skills industry require:

“I’m very concerned that students get to know what it’s like working in a company, it helps them to understand what’s going to happen when they graduate. If they come into the workplace totally unaware of business, it can be a big stretch for them. I think it’s very important to encourage business and education to link up”.

These links enhance student learning and could ensure that graduates have the required skills and they are ready to contribute to the organisations that hired them. In addition to this, industry input into the curriculum is a requirement of accreditation by professional bodies in the UK (ACBEE, 2005; Dickens, 2006).

Coughlan cited Steve Smith, the incoming president of Universities UK, who said:

"It's vital that we continue to invest in our university sector. Our world-class higher education sector is one of the UK's outstanding success stories." Adding:

"We know that, as the economy continues to shift towards more knowledge-based activities, the UK is going to need more people with higher-level skills. And of course, these same people - and society generally - benefit from the life-enhancing experience of higher education" (Coughlan, 2009).
2.2.2 Workplace learning

Integrating experience in education is a successful pedagogical model in many educational fields. It supports student interaction and subsequent reflections, and would develop skills early in the curriculum. Students gain an appropriate and sufficient understanding of their courses materials. It enhances critical thinking and encourages students to reach their creative limits to look for new ideas, identify new approaches and create new solutions (Shuell, 2001; Keska, 2009; Mantri et al., 2009). Incorporating work-based learning in education aligns theoretical topics with industrial environments and equips students with hands-on experience, and communication and technical skills (Eyler and Giles, 1999; The Pedagogy for employability group, 2006; The Pedagogy for employability group, 2006; Szabo & Karacal, 2009).

Workplace environment can provide opportunities for learning and prepares students to work in changing and new contexts. “Learning-by-doing method” increases student enthusiasm and their interest in the subject which could increase the students’ learning effectiveness (Eraut, 1994; Tynjälä, 2008; Hwang et al., 2009; Shu, 2009).

Workplace learning can change the nature of learning in contexts and enhance learning in both educational and workplace environments (Boud and Solomon, 2001). Tynjälä (2008) stated that “it can be said that there is little that people cannot learn at work!” She has mentioned the following categories of learning outcomes: task performance, awareness and understanding, personal development, collaborative work, role performance, academic knowledge and skills; decision making and problem solving, and judgement.

Students can practise how to take minutes in a project meeting, analyse communication practices in the workplace and write work-related documents. Students gain the ability to learn from experience, deal with complexity, and make decisions under conditions and pressure, and judge the quality of performance, outcomes, issues and levels of risk.

Work-based learning for students can be organised in different ways and through different programmes in order to fill the gap between education and workplace requirements. Therefore, one of the essential roles of the educational institutions is to
develop partnerships with workplaces to create environments for learning (Boud & Solomon, 2001; Griffiths and Guile, 2004; Evans, 2006; The Pedagogy for employability group, 2006). Tynjälä (2008) emphasised on the importance of partners’ roles for implementing workplace learning and stated:

“individual and group learning at the workplace can be characterised as a highly social activity which (1) requires interaction and dialogue, (2) requires the kinds of challenges that make learning necessary, and (3) involves reflection on past experiences and the planning of future activities.”

Partners should promote and support skills development in the workplace and assure about the quality of training.

2.2.3 Skills demanded by industry

The challenge of delivering professional skills has been a concern for the UK; back in 1776, Adam Smith stated that “the greater part of what is taught in schools and universities does not seem to be the proper preparation for that of businesses” (Leitch, 2006).

Technology is rapidly improving, and it is increasing skills requirements across the economy. It highlights the role of engineers in society and developing a successful economy and the importance of skills over the coming years (Leitch, 2006; Robinson, Bramhall, & Rowe, 2007)

It was estimated that there would be 370,000 new job openings over the next ten years (Bowen, Prior, Lloyd, Thomas, & Newman-Ford, 2007). Therefore, shortages of suitable engineers and skill gaps could impact UK businesses’ performance. There are concerns about the type of graduate engineer that companies want to recruit, as well as their quantity. The National Employers Skill Survey stated that 95% of manufacturing and engineering firms have found it difficult to recruit graduate level engineers, and skills shortages have a negative effect on their business. Specific gaps have been identified in technical, practical, communication skills, problem solving, and ability in maths
Spinks, *et al.* (2006) measured skill shortages in particular types of engineering by indicating the difficulty of recruiting graduates. As the results show (Table 2-1) building services, systems, civil, and electrical/electronic are the most problematic engineering areas for recruitment.

<table>
<thead>
<tr>
<th>Type of Engineer</th>
<th>Number of firms recruiting</th>
<th>Not a problem to recruit</th>
<th>Difficult to recruit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building services</td>
<td>14</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Systems engineering</td>
<td>99</td>
<td>39</td>
<td>60</td>
</tr>
<tr>
<td>Civil</td>
<td>25</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>Electrical/electronic</td>
<td>169</td>
<td>70</td>
<td>99</td>
</tr>
<tr>
<td>Production/manufacturing</td>
<td>119</td>
<td>60</td>
<td>59</td>
</tr>
<tr>
<td>Chemical</td>
<td>34</td>
<td>19</td>
<td>15</td>
</tr>
<tr>
<td>Mechanical</td>
<td>209</td>
<td>120</td>
<td>89</td>
</tr>
<tr>
<td>Computer sciences</td>
<td>109</td>
<td>63</td>
<td>46</td>
</tr>
</tbody>
</table>

A previous research showed that employers put skills such as social and communications skills higher than the subject specific knowledge (Jenkins and Pepper, 1987). Furthermore, more recent research (Spinks et al., 2006) shows strong evidence that practical application, creativity and innovation, and team working are the top priorities in terms of future skills (Table 2-2).

<table>
<thead>
<tr>
<th>Skills and Attribute</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practical application</td>
<td>4.35</td>
</tr>
<tr>
<td>Creativity and innovation</td>
<td>4.24</td>
</tr>
<tr>
<td>Team working</td>
<td>4.03</td>
</tr>
<tr>
<td>Theoretical understanding</td>
<td>3.87</td>
</tr>
</tbody>
</table>
Later on in this thesis, it will be discussed what the most important factors are for the employers when they recruit graduates.

### 2.2.4 Recommendations

Undergraduate engineering education in the UK will require input from the Government, the engineering professions, industry and academia to meet the demands of the 21st century. Government could increase university funding to cover the cost of providing first class teaching in engineering and increase the funding for engineering education initiatives, which strengthen industry links. However, this is not going to happen in the current climate as Lord Mandelson, Business Secretary, stated that the government is to cut university funding in England by a total of £398m for 2010-11 compared with 2009-10 (Eason, 2009). Though, Sir Alan Langlands, Chief Executive of HEFCE, said:

> “This is a challenging financial settlement, but we are doing all that we can to support excellence in teaching and research by keeping across-the-board reductions in core funding to universities and colleges to a minimum. Our approach will also give institutions maximum flexibility to pursue their priorities. In addition we will maintain our commitment to widening participation and to strategically important subjects in science, technology, engineering and mathematics.” (HEFCE, 2010)

Employers and academics collaborative research could provide more understanding of the industry and its employment methods which may be an important step in addressing the performance concerns of the sector (Dainty et al., 2007). Industry can establish active and long-term relationships with university engineering departments in the area of education to ensure the industry needs are reflected in the curriculum. Also, industry could engage actively with the Government's programme, work with the Institutions in degree accreditation, and encourage industrialists to spend time in universities.

Universities could facilitate deeper academic staff interaction with industry and support links with industry in education and teaching. It is needed to ensure the requirements of companies are understood and reflected in the curriculum, and that courses produce
graduates with a high level of relevant technical skills (Dickens, 2006; Spinks, Silburn, & Birchall, 2006; The Royal Academy of Engineering, 2007).

Businesses think universities should focus on working with industry to provide more work experience placements for students. Therefore, activities in relation to arranging work experience are a good opportunity for universities to improve their engagement with businesses. A recent study has shown that 45% of SMEs currently have no links with universities, therefore, improving engagement with the small and medium-sized firms may be the greatest chance for university departments to establish the links with the employers (CBI, 2009b).

### 2.2.5 National Context

The teaching of transferable skills and the involvement of industry in the education of students have been a high priority in the UK for a number of years and the needs for closer relations between industry and universities have been highlighted in various government white papers and reports (Roberts, 2002; Leitch, 2006; The Royal Academy of Engineering, 2007).

Centres for Excellence in Teaching and Learning (CETLs) were introduced in 2003. CETLs are the largest ever funded programme for teaching by the Higher Education Council for England (HEFCE) with total funding of £315M over five years. The work of the CETLs includes academic support, learning spaces, pedagogical research, and curriculum development.

The Engineering Centre for Excellence in Teaching and Learning (engCETL) at Loughborough University was set up in March 2005 as one of the 74 CETLs, with recurrent funding totalling £2.5m over five years and a capital grant of £1.65m. The centre focuses on industry and education relations and links with seven departments including Civil and Building Engineering.

A pedagogic research programme in the CETL aims to collect evidence and build models of practice that can maximise the benefit for all parties and ensure sustainable engagement.
The CETL is integrating pedagogic research with the work of academics and students in engineering to develop the pedagogy of engineering education and employment. It focuses on skills needed within industry, and captures current practice from both the university curriculum and sandwich placements. The impact of industry input into student learning is a particular focus.

The research links practice to pedagogic theory to develop models for the improvement and assessment of personal skills within engineering. It considers the use of real learning spaces and learning support in both universities and workplaces and how and why they impact on student knowledge and attitudes.

The remit of the CETL was first to enhance learning of the students in the seven core departments, then to disseminate practice across the university and finally to disseminate practice nationally (Crawford and Dickens, 2008).

2.2.6 Sponsorship

The term “sponsorship” has many meanings. Klincewicz defines it as:

“an agreement, in which the sponsor undertakes an action with economic nature for the sake of a sponsored subject.” (Klincewicz, 1998)

Sponsorship is a two-dimensional relationship which involves mutual benefit to both sponsor and sponsored. Masterman (2007) cited Jiffer and Roos (1999) who reinforced the idea that sponsorship should benefit all the parties involved. In fact, successful sponsorship is concerned with achieving a return on objectives and investment (Masterman, 2007).

In education, sponsorship is financial assistance provided by a sponsor in the form of a salary, bursary, award or allowance during the course of study. Sponsors mostly offer sandwich courses or industrial placements and provide opportunities for the students to gain work experience and professional training throughout their degree studies. Sponsorship could help students to complete their university course without going under huge amounts of debt. The student finance has been an important issue for many years;
however, sponsorship as a source of student earnings has rarely been debated. Sponsorship schemes are offered by a range of organisations but industrial sponsorship is the most common type and some degrees such as Engineering, IT, Physics, Chemistry and Business related courses attract more sponsorships than others (Gordon, Hutt, & Pearson, 1985b; Foley, 2004).

A lack of assessment of sponsorship and lack of research or dissemination of knowledge about what sponsorship can do and how it can be successfully managed are general issues with sponsorship (Masterman, 2007).

2.2.6.1 Sponsorship benefits and disadvantages

Industrial experience, whether before or during university, is seen as a major factor in employment of new graduates by the majority of companies. For employers of today's graduates, a degree alone is not enough and graduates need to have a range of personal skills that they can apply in the workplace.

Sponsorship of engineering students is an effective way for students to gain work experience and industrial training during their courses. It could be a year placement, a vacation job or four years of support. All of these types are useful and can help. However, the longer term sponsorship gives students the opportunity to take more responsibility and as a result their portfolio grows.

In the majority of cases sponsorships lead to job offers upon graduation, which takes the hassle of job hunting out of a busy final year. It should also be noted that around 400,000 graduates are entering the jobs marketplace each year and in addition to this many companies take 60% or more of their graduate intake each year from sponsored or placement students (Foley, 2004; Wood, 2004). Therefore, students should think about job hunting and approach employers as early as they can and not leave it until they are about to graduate.

In addition, sponsorship offers financial support which, depending upon the size of the company and the type of industry, can earn students on average:

- a gap year before studying with £10,000 per annum,
• a "Sandwich" placement year during studies of £12,000+ per annum,
• vacation work of £200-£250 per week, and
• bursary payments of £1000+ per year (Foley, 2004; Wood, 2004).

Companies offer sponsorship for a range of reasons. But essentially it helps them to maintain a close relationship with students and attract good graduates early before they receive other job offers in their final year. They gain access to students who have the potential to become their future employees and a future advantage to their company. In addition they can train the students during the course of their studies and monitor their performance and interest in the company. It also improves their employee productivity and job satisfaction and enhances the company’s image (Gordon, Hutt, & Pearson, 1985a; Foley, 2004; Dickens, 2006).

In addition, sponsorships over the next few years will be more about market share rather than market size. While Pearson and Baker (1984) reported that the number of graduates in the shortage disciplines of engineering was slowly increasing, a recent report from HEFCE (2008) indicates that there has been little or no increase in the number of graduates in strategically important and vulnerable subjects, such as engineering disciplines, between 2002-03 and 2005-06 (Pearson and Baker, 1984; HEFCE, 2008). Therefore, when sponsored students plan to join their sponsored companies, they could be considered as partly removed from the labour market for new engineering graduates and non-sponsoring employers could face increased recruitment difficulties in particular areas.

Previous studies (Gordon, Hutt, & Pearson, 1985a; Building, 2004) pointed out that industrial sponsorship could encourage students to study specific subjects and courses so it could help to increase the number of students to enter courses in shortage areas. Between 1994 and 2003, applications for construction related degree courses fell by 40%. Sponsorship schemes were improved, in order to raise the level of interest among potential students and equip graduates entering the job market with sufficient practical experience and an understanding of the whole construction process for working in integrated supply chains (Building, 2004).
Apart from the armed forces, the rules and conditions of many sponsor companies do not tie students to employers on graduation for a period of years. There is usually no requirement either for the sponsored student to join the sponsor company on graduation or for the employer to offer a job. However, there are hopes and expectations that things do work out to the benefit of all parties.

Commitment to one company, poor quality and organisation of training in some cases, working during holidays and summer time, and the length of course have been perceived by students as some sponsorship disadvantages (Gordon, Hutt, & Pearson, 1985a).

2.2.6.2 Example of Engineering Undergraduate Sponsorship schemes

There are a variety of sponsorship schemes in existence within industry. The most common schemes link students to their sponsoring companies before or during their studies (Mason, 2004). However, it is difficult to gain the exact extent of the existing schemes as each university/department has its own definition and limitations of sponsorship. The following section explains a number of the industrial sponsorship schemes in the undergraduate level in engineering.

The sponsored programmes at Loughborough University

Three of the five engineering departments at Loughborough currently include sponsored degree programmes: Civil and Building Engineering, Electronic and Electrical Engineering and the Wolfson School of Mechanical and Manufacturing Engineering. Each programme is influenced by its own consortia and operates in a slightly different manner. This section gives a summary of these programmes.

The Department of Civil and Building Engineering has three sponsored programmes, attracting about 60-100 new sponsored students per year. The department has formed a consortium with 24 leading consulting engineers and contractors to sponsor students on the MEng Civil Engineering, BSc Construction Engineering Management (CEM) and BSc Commercial management and Quantity Surveying programmes (CMQS).

In the early 1990s, industry felt that the graduates from Building degrees and Quantity Surveying degrees were more focused on professional practice rather than construction
companies. Therefore, the Department of Civil and Building Engineering invited a group of major contractors to discuss the issue and two BSc sponsored programmes, (CMQS) and (CEM) were developed as a partnership between Loughborough University and fifteen large construction organisations (Higher Education Academy Engineering Subject Centre, 2009).

The objectives of these programmes are to provide industry input to the design of the curriculum in these areas. Initially, and for many years, it was a condition for all students admitted to the programmes to be accepted by a sponsor as well as the university but now students are registered who just meet university requirements, due to difficulties faced by companies during the recent recession.

A consortium model introduced to the MEng Civil Engineering programme in 2001 and employers such as consulting engineers have been included to reflect the different employment destination of these graduates. Including more consulting engineers and expansion to the BEng programme as well as MEng have been further developments of the scheme to reflect growing industry demand for students to sponsor (Dickens, 2006).

The Systems Engineering degree is currently sponsored by BAE Systems, Frazer-Nash Consultancy, SELEX Sensors and Airborne Systems. It has been offered for the last 15 years and recruits between 25 and 40 students per year.

An Industrial Consortium of companies (including Bentley, Rolls Royce, Indesit, Caterpillar and Siemens) provides MEng students in the Innovative Manufacturing Engineering (IME) degree with industrial experience and sponsorship. This programme has been running for just over five years in the Wolfson School of Mechanical and Manufacturing Engineering.

**SUCCESS**

The School of Civil Engineering and the Environment at Southampton University offer the “Southampton University Corporate Civil and Environmental Scholarship Scheme” (SUCCESS). All first year students can submit an application once they have registered on the course and the companies in the scheme short-list candidates for interview. The
scheme provides continuing sponsorships to students selected in their first and second year of study. It includes a financial package of between £1000 and £1700, summer work placements and possible long-term employment opportunities on graduation (http://www.civil.soton.ac.uk/aboutus/partners/).

**ICE QUEST**

The Institution of Civil Engineering (ICE) offers the QUEST awards to support and encourage education in civil engineering. The Queen’s Jubilee Scholarship Trust (QUEST) awards were set up in 1977 and the scheme works with some of the UK’s leading civil engineering and construction companies to offer students financial support of up to £3,000 a year, mentoring and sought-after industry work experience placements. The ICE has a target of awarding at least 100 scholarships a year. Scholars match with a partner company and are obliged to do an 8 week summer placement with their partner company and provide a satisfactory annual report. There is also now a major new sponsor, Construction Skills, which aligns the QUEST award scheme with their “Inspire Scholarship” (http://www.ice.org.uk/).

**INSPIRE**

The Inspire scholarship is offered by the Construction Industry Training Board in partnership with the UK’s top construction companies. It launched in 2005 and offers the students in construction and the built environment up to £9,000, over the duration of their courses, in addition to a 10 week work placement between first and second year of university. This may be increased by mutual agreement with the student.

Once a scholar has been chosen, the employer decides how much sponsorship to offer them. This is between £750 and £1500 per year matched by CITB-ConstructionSkills so that the student receives between £1500 and £3000 per year. A contract is signed between the employer and ConstructionSkills to this effect (https://www.bconstructive.co.uk/inspirescholarship).
University of Surrey, ICE, Inspire Scholarship

The University of Surrey has formed an alliance with the Institution of Civil Engineers (ICE) and a broad range of leading companies in the profession. The annual intake on the scholarship on the Civil Engineering programme is around thirty with over twenty sponsoring companies. Students are matched with a sponsor company during their first semester and that company will provide practical training and funding support throughout their course. In return the students spend a period training with the sponsors over the summer vacation at the end of each academic year.

The industry bursary is £1800 per annum plus top up funding by Inspire, which will mean that the scholars will receive £3000 per annum (http://portal.surrey.ac.uk).

Engineering Industrial Sponsorship Programme (RESPECT) in the University of Birmingham

The RESPECT programme is open to UK undergraduate students entering Civil and Mechanical Engineering programmes. The scheme links with sponsoring companies across Civil and Mechanical engineering, representing industries such as: civil engineering contractors and consultants, public utilities, automotive design and development, and volume product manufacturers.

The sponsors offer a bursary of £1500 per year of study, guaranteed work experience during summer vacations, and potential for guaranteed employment with them upon graduation (http://www.eng.bham.ac.uk/mechanical/study/undergrad/).

AutoCRC undergraduate programme

The Cooperative Research Centre for Advanced Automotive Technology Ltd (AutoCRC) is an agent for the development of innovative technologies in the Australian automotive industry. The AutoCRC industry based final year undergraduate project programme provides students in the final year of their undergraduate degree the opportunity to work with industry experts on real industry problems. AutoCRC projects are offered to up to 100 students per year from eight universities around Australia. Universities select the
projects that fit most closely with their teaching programmes and AutoCRC provides $5000 funding for each project (up to 50 projects annually) (Neely and White, 2007).

2.3 The basis of impact

Measuring impact is an important part of each organisation’s policy to clarify “what actually works”. The organisation’s mission and its values are the key elements of measuring the impact of an activity and proving the values.

Impact is the experimental or potential difference, that an activity, project, or organisation is making in real people’s lives. It can make changes in behaviour, attitude, practice or situation and includes planned, positive, and long-term as well as short-term effects and negative consequences. Wainwright (2006) cited Blankenburg (1995) as he describes impact as:

“...long-term and sustainable changes introduced by a given intervention in the lives of beneficiaries. Impact can be related either to the specific objectives of an intervention or to unanticipated changes caused by an intervention; such unanticipated changes may also occur in the lives of people not belonging to the beneficiary group. Impact can be either positive or negative.”

Impact is also concerned with change in areas such as economic, environmental, social, and health. When a project/activity’s impact is reported it needs to:

- highlight the difference that the project/activity makes for the society,
- state outcomes and benefits to society, and
- make it clear why the project/activity should be continued.

(http://www.extension.unl.edu/c/document_library, 2007; Sanfilippo et al., 2006; Wainwright, 2006)

However, there are challenges in measuring the impact in the social sciences and the usefulness of different types of impact measurement is limited, especially if the factors being measured are long-term. In these cases, the measurements rely heavily upon
subjective measures and the participants’ motivations and aspirations affect the measurements (Wainwright, 2006; Ahmed, 2009).

### 2.3.1 Measuring impact

In order to measure the impact, there is a need to illustrate what has happened and capture the process of change. Therefore, objective outcomes need to be identified and the changes in subjective effects such as ideas, opinions, or attitudes need to be demonstrated. The changes can be measured in different groups of the investigated population or in the same group before and after the expected impact. The following steps are considered when measuring the impacts:

- developing or choosing indicators,
- structuring the survey,
- collecting information, and
- analysing the information.

The first step is developing indicators, in order to clarify what changes have happened as a result of the activity and track the outcomes and impacts. The indicators can be either quantitative or qualitative (Table 2-3). They are used to map numbers on values, for example: 1 = not important, 6 = very important. This approach enables researchers to use all the power of mathematics and statistics for the data and draw conclusions from them (Brown, 2005).

<table>
<thead>
<tr>
<th>Quantitative indicators</th>
<th>help to answer questions about things that are inherently expressed in numbers.</th>
</tr>
</thead>
<tbody>
<tr>
<td>How many?</td>
<td></td>
</tr>
<tr>
<td>How often?</td>
<td></td>
</tr>
<tr>
<td>How much?</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Qualitative indicators</th>
<th>help to demonstrate, describe or measure that something has happened.</th>
</tr>
</thead>
<tbody>
<tr>
<td>How?</td>
<td>Which?</td>
</tr>
<tr>
<td>When?</td>
<td>What?</td>
</tr>
<tr>
<td>Who?</td>
<td>Why?</td>
</tr>
<tr>
<td>Where?</td>
<td></td>
</tr>
</tbody>
</table>
Then, in a variety of ways questions can be asked from participants about which changes have happened and how. These questions gather information about the intended effects and changes, and sometimes show unintended effects or negative consequences. Analysing information about the changes enables a researcher to maximise positive change and minimise any negative effects.

In this research, the indicators were used to identify:

- the outcomes of sponsorship (e.g. whether the students have benefited from the sponsorship element of their degree programme and in what aspects, particularly) and
- the parties’ opinions about the schemes (e.g. whether or not they feel their expectations have been met by the reality of sponsorship).

Indicators of measurements are defined in the form of rank variables, which are based on assigning a value to a number. For example for measuring the impact of a variable such as the influence of availability of financial aid, the values from “not at all” to “considerable” were assigned to numbers from 1 to 6.

2.4 Theories of Learning

There are three sets of learning theory generally used in educational circles: behavioural, humanistic, and cognitive (Dunn, 2002; Learning Theories Knowledgebase, 2008; Atherton, 2009).

*Behavioural* is a particular picture of a positivist "scientific" approach to learning. Behaviorism focuses only on the objectively observable aspects of learning and how the environment impacts obvious behavior. According to the behaviorists, learning can be defined as relatively permanent change in behavior brought about as a result of experience or practice. They consider that learning might not manifest itself in observable behaviour until some time after the educational program has taken place.

*Humanistic* theory assumes that people act with intentionality and values. Humanists emphasise the "natural desire" of everyone to learn. This is in contrast to the behaviorist notion of operative conditioning which argues that all behavior is the result of the
application of consequences. The learning will take place by the instructor acting as a facilitator, that is by establishing an atmosphere in which learners feel comfortable to consider new ideas and are not endangered by external factors. Learners need to be empowered and to have control over the learning process. Humanists also believe that it is necessary to study the person as a whole, especially as an individual grows and develops over the lifetime (Learning Theories Knowledgebase, 2008).

Cognitive theory is interested in how people understand material. The cognitive psychologists believe that the discovering knowledge or constructing meaning is central to learning (Learning Theories Knowledgebase, 2008). This theory is the basis of the educational approach known as constructivism and the experiential learning theory. The emphasis is on the importance of experience, meaning, and the development of insights. This theory has developed the notion that individuals have different needs and concerns at different times. Therefore, they have subjective understandings in different contexts and each individual has his/her own particular style of learning (Dunn, 2002). The appreciation of the existence of different learning styles helps to adopt new methods and techniques to support learning process (Houghton, 2004).

### 2.5 Learning styles

Learning styles are simply different approaches or ways of learning (Bogod, 1998). Students learn in many ways, like seeing and hearing; reflecting and acting; reasoning logically and intuitively; memorizing and visualizing and building mathematical models (Felder and Silverman, 1988). A learning-style model classifies students according to their learning style and the ways they receive and process information. Knowing the learning style can accelerate learning process as the learners will undertake activities that best fit their preferred style and also help avoid repeating mistakes (Atherton, 2009). Kolb (1984), Honey and Mumford (1986) who simplified Kolb’s original questionnaire, and Felder and Silverman’s inventory (ILS) (1988) are the most well known models.
2.5.1 Kolb's model

A common approach to viewing learning styles is linked to a learning cycle of concrete experience, observation and reflection, abstract conceptualisation, and testing concepts in new situations. This cycle commonly referred to as the “Kolb Learning Cycle”. Although, it was first proposed by Dewey, Lewin, and Piaget who got the idea from control engineering (Houghton, 2004).

The Kolb styles model is based on the Experiential Learning Theory which helps instructors to think about the types and sequencing of activities in order to support students as they engage in real instructional design processes (Kolb, 1984). According to this model, the ideal learning process engages all four of these modes in response to situational demands. The concrete experience is the basis for observations and reflections, which allow the development of a 'theory'. The 'theory' is then tested in new situations to lead to more concrete experience (Kolb, 1984; Dunn, 2002). The process is continuous and can begin at any of the stages but in order for learning to be effective, all four of these approaches must be incorporated. The Kolb's model is actually two models in one. A four step learning process (Figure 2-1): Concrete experience (Feeling), Observation and reflection (Watching), Abstract conceptualisation (Thinking), and Testing concepts in new situations (Doing).

![Figure 2-1: Kolb’s cycle of experiential learning (Houghton, 2004)](image)
The model then goes on to describe the four learning styles used within the learning process (Figure 2-2):

- Diverging (feel and watch),
- Assimilating (think and watch),
- Converging (think and do), and
- Accommodating (feel and do).

Figure 2-2: Kolb’s learning style (Chapman, 2006 - based on Kolb’s learning styles, 1984)

- **Divergers** - view situations from many perspectives and rely heavily upon brainstorming and generation of ideas. To be effective, the instructor should function as a *motivator*.
- **Assimilators** - use inductive reasoning and have the ability to create theoretical models. To be effective, the instructor should function as an *expert*.
- **Convergers** - rely heavily on hypothetical-deductive reasoning. The instructor should function as a *coach*, providing guided practice and feedback in the methods being taught.
• **Accommodators** - carry out plans and experiments and adapt to immediate circumstances. To be effective, the instructor should maximize opportunities for the students to discover things for themselves (Kolb, 1984; Provitera and Esendal, 2008).

This thesis later on examines the role that sponsorship may play within the Kolb learning cycle, allowing students to reflect on their experiences and use feedback from others to process their ideas, and integrate their new ideas into future assignments. It then describes how to apply Kolb's model of experiential learning to the design of and sequencing of activities in the sponsored programmes in order to provide adequate support and opportunity for reflection, practice, and experimentation for students.

### 2.5.2 Honey and Mumford’s model

Kolb is the inspiration for a large numbers of theorists. For example, Honey and Mumford's model, Learning Styles Questionnaire (LSQ), is directly derived from Kolb's theory. Honey and Mumford (1986) found that the learning style inventory was not accessible to managers and had low face validity with managers. Therefore, rather than asking people directly how they learn, as Kolb's LSI does, Honey and Mumford gave them a questionnaire that probes general work-related behavioral tendencies (Clark, 2004).

The Honey & Mumford *Learning Styles Questionnaire* (LSQ) is a self-administered tool. By completing the self-assessment, managers are encouraged to focus on strengthening underutilised styles in order to become better equipped to learn from a wide range of everyday experiences (Honey and Mumford, 1986; Houghton, 2004; Atherton, 2009).

They identified four styles of learning, which had much in common with Kolb's work and had strong correlations with the learning cycle. The Honey and Mumford stages are:

- Having an experience
- Reviewing the experience
- Concluding from the experience
- Planning the next steps.
In the Honey and Mumford cycle, the stages were renamed to accord with managerial experiences of decision making/problem solving. They replaced the terms reflector for divergers, theorist for assimilators, pragmatist for convergers, and activist for accommodators.

They also suggest that people prefer different methods of learning, depending upon the situation and their experience level, thus they can move between the four modes of learning and jump in any part of the cycle, rather than being locked into one mode and then quit when they consider themselves as successful (Clark, 2004). Figure 2-3 presents the Honey and Mumford model.

Honey and Mumford (1986) have built a typology of Learning Styles around this sequence, identifying individual preferences for each stage (Activist, Reflector, Theorist, Pragmatist respectively).

- **Reflectors** - prefer to learn from activities that allow them to watch, think, and review what has happened; like to use journals and brainstorming; use information from past, present and immediate observations to maintain a big picture perspective. Lectures are helpful if they provide expert explanations and analysis.
- **Theorists** - prefer to think problems through in a step-by-step manner; incorporate dissimilar facts into coherent theories; keen on basic assumptions and theories; like
lectures, case studies, models, and readings. Talking with experts is normally not helpful.

- **Pragmatists** - prefer to put ideas, theories and techniques into practice to see if they work; search new ideas and experiment; like laboratories, field work, and observations; like feedback, coaching, and obvious links between the task-on-hand and a problem.

- **Activists** - prefer the challenges of new experiences and involvement with others; are open minded, enthusiastic, flexible; act first, consider consequences later; like problem solving and small group discussions (Clark, 2004).

### 2.5.3 The Index of Learning Styles (ILS)

Learning styles of most engineering students and teaching styles of most engineering professors are not compatible in some extents which lead to poor student performance and professorial dissatisfaction (Felder & Silverman, 1988). Therefore, Richard Felder and colleagues proposed a model intended to be particularly applicable to engineering education to minimise this effect. They proposed a parallel corresponding teaching-style model, which classifies instructional methods according to how well they address the proposed learning style components. The learning and teaching style dimensions that define the models are shown in the Table 2-4.

<table>
<thead>
<tr>
<th>Preferred Learning Style</th>
<th>Corresponding Teaching Style</th>
</tr>
</thead>
<tbody>
<tr>
<td>sensory</td>
<td>concrete</td>
</tr>
<tr>
<td>intuitive</td>
<td>abstract</td>
</tr>
<tr>
<td>visual</td>
<td>visual</td>
</tr>
<tr>
<td>auditory</td>
<td>verbal</td>
</tr>
<tr>
<td>inductive</td>
<td>inductive</td>
</tr>
<tr>
<td>deductive</td>
<td>deductive</td>
</tr>
<tr>
<td>active</td>
<td>active</td>
</tr>
<tr>
<td>reflective</td>
<td>passive</td>
</tr>
<tr>
<td>sequential</td>
<td>sequential</td>
</tr>
<tr>
<td>global</td>
<td>global</td>
</tr>
<tr>
<td>perception</td>
<td>content</td>
</tr>
<tr>
<td>input</td>
<td>presentation</td>
</tr>
<tr>
<td>organization</td>
<td>organization</td>
</tr>
<tr>
<td>processing</td>
<td>student</td>
</tr>
<tr>
<td>understanding</td>
<td>participation</td>
</tr>
</tbody>
</table>

*Table 2-4: Dimensions of Learning and Teaching Styles (Felder & Silverman, 1988)*
The proposed learning style dimensions are:

- Sensing and Intuitive Learners,
- Visual and Auditory Learners,
- Inductive and Deductive Learners,
- Active and Reflective Learners, and
- Sequential and Global Learners.

**Sensing and Intuitive Learners**

*Sensors* - like facts, experimentation and solving problems by standard methods; are patient with detail; are good at memorizing facts; are careful but may be slow.

*Intuitors* - prefer principles and theories; like innovation; are bored by detail and welcome complications; are good at concepts; are quick but may be careless. Most engineering courses emphasize concepts rather than facts and so favour intuitive learners.

**Visual and Auditory Learners**

*Visual learners* - remember best what they see: pictures, diagrams, flow charts, timelines, films, and demonstrations. If something is simply said to them they will probably forget it. Engineering students have a preference for visual learning rather than auditory learning.

*Auditory learners* - remember much of what they hear; they get a lot out of discussion; prefer verbal explanation to visual demonstration; learn effectively by explaining things to others.

**Inductive and Deductive Learners**

*Inductive learners* - need motivation for learning; need to see the phenomena before they can understand and appreciate the underlying theory. Most engineering students view themselves as inductive learners.

*Deductive learners* - prefer to start with abstractions or principles and enjoy deducing the consequences; can better accommodate themselves to unmotivated material, but prefer structured presentations of materials.
Active and Reflective Learners

Active learner - feels more comfortable with active experimentation than reflective observation; tend to be experimentalists; do not learn much in situations that require them to be passive; work well in groups. There are indications that engineers are more likely to be active than reflective learners.

Reflective learners - learn better in situations that provide them opportunity to think about the information being presented; tend to be theoreticians; work better by themselves or in a small group.

Sequential and Global Learners

Sequential learners - follow linear reasoning processes when solving problems; can work with material when they understand it partially or superficially; may be strong in convergent thinking and analysis; learn best when material is presented in a steady progression of complexity and difficulty. Engineering students are heavily oriented to sequential learning rather than global learning.

Global learners - make intuitive leaps and may be unable to explain how they came up with solutions; may be better at divergent thinking and synthesis; sometimes do better by jumping directly to more complex and difficult material; do not learn in a steady or predictable manner (Brent and Felder, 2005).

2.6 Summary

The requirements of industry change and all employment sectors and career areas are subject to these changes. It is very important to make sure that students learn to cope with the uncertainty that goes with their career. Development of professional skills requires the integration of different types of knowledge and interaction between theory and practice. Therefore, universities programmes should adopt certain features of workplace learning which can generate new kinds of learning opportunities.

Learning in real work environments is very important in helping students to develop their competencies. Students obtain an understanding of contexts and situations, and gain a
range of skills required including collaborative working, leadership, crisis management, building relationships, and the ability to learn from experience.

In recent years, there has been an increasing emphasis on the development of employability skills in the UK graduates, and it has been recognised that involving industry in engineering education provides a very good way of developing these skills.

Furthermore, accreditation by professional bodies requires industry involvement in engineering degree programmes and government reports have raised employer engagement with higher education as a key element for economic growth.

Most of the universities work closely with employers who offer placements and sponsorships in conjunction with their courses. Placements are paid employment during students’ study or holidays, which enable them to put their learning into practice and enhance their skills and knowledge. However, sponsorship is for the students who are looking for a longer term commitment to the company. They will receive a bursary per year, which help them with tuition fees and other training expenses, paid placement, and a greater understanding of the industry.

The sponsorship schemes in the Faculty of Engineering at Loughborough University, in partnership with sponsoring companies in different engineering disciplines, provide undergraduate students with experience of working on real-world problems. The schemes can also provide models for university departments in building a long-range mutual relationship with industry. In addition, this collaboration is an opportunity for employers to gain new ideas and pass on their valuable expertise to the profession.

Despite the benefits of industrial sponsorship to the students, universities and employers, there is a lack of evidence about:

- the degree of attractiveness of sponsorship to the parties,
- the success of the existing schemes, and
- the areas that need improvement.

These issues are considered in the chapters on results and discussions.
This chapter also showed that measuring impact allows organizations to find out about their organisation’s performance which informs decision makers. It highlights the difference that their activities make for society and states the reasons why the activity should be continued. This research measures the impact of industrial sponsorship on the stakeholders in order to propose guidelines for further dissemination. A variety of qualitative and quantitative methods are used to measure the impacts. Combining data from both qualitative and quantitative methods provides a fuller understanding of the phenomenon under investigation than just relying on only one method and increases the validity of the study (Speziale and Carpenter, 2007).
Chapter 3: Research design and methodology

The first part of this chapter describes the different stages of project design and explains what is involved in each stage including an introduction to the stakeholders and the areas of the research. The second part outlines the philosophical background and the methodological approach of the research as well as providing the timeline of design and data collection activities. It describes the underlying reasons for choosing the methods used in this thesis for measuring impact by considering their strengths and weaknesses. These methods include questionnaire, interview, and documentary analysis. It also gives details of subject population and addresses ethical issues in the research.

3.1 Research design

The research question is “What is the impact of industrial sponsorship on students, academia and industry?” which is shown schematically in Figure 3-1. The proposed project outcome is to develop a sustainable model of effective practice for further dissemination of sponsorship of undergraduate engineering students. This section explains the research design taken to answer this question. The research design divided into 4 stages: literature review, data collection, data analysis, and documentation (Figure 3-2).
Figure 3-2: Research design: the impact of industrial sponsorship on students, academia and industry
The Literature review covers:

- history, benefits, issues of university-industry collaboration and recommendation to improve the links,
- engineering education and its role in giving engineers a better knowledge of engineering in industry, skills needed by industry, recommendation for improving engineering education in the 21st century, the role of industrial sponsorship on education of undergraduate engineering students, and exploring the existing sponsorship schemes in undergraduate programmes, and
- learning theories and learning styles that generally used in educational circles.

During the data collection stage, data has been collected from the following parties which include both those involved and not involved in the sponsorship schemes (Figure 3-3):

- undergraduate engineering students,
- recent sponsored graduates,
- university engineering departments, and
- employers.

Data have then been analysed in order to answer the main research question by investigating the following subsidiary questions:

- What are the benefits derived from sponsorship by students, academics and industry?
- What are the incentives for these stakeholders?
- What impact does sponsorship have on student employability?
- What is the role of sponsorship in building a relationship between students and their future employers?
- How does industrial sponsorship influence learning outcomes of degree programmes?
- Is there a link between influence on the curriculum, programme quality and student employability?
- What is the degree of sponsorship attractiveness to the investigated companies?
• Why do not all students apply for sponsorship when it is available?
• What are the factors that prevent more departments offering sponsored programmes?

At the final stage of the data analysis, a model of effective practice for a sustainable student-university-industry link through sponsorship has been developed by considering students’ views and expectations, university parameters and industry factors and criteria.

In the documentation phase, literature reviews were completed and thesis material were reviewed and finalised.
Figure 3-3: Data collection target groups and investigation areas
3.2 Methodology

This section explains the approach used in this study to measure the impact of industrial sponsorship on three stakeholders in order to identify and boost the benefits for the involved parties and identify the weaknesses of sponsorship and improve them. Developing a sustainable model of effective practice for further dissemination is the ultimate goal. This research is a mixed-method cross-sectional and longitudinal study which observes engineering students' achievements and developments as they move into, through, and beyond their sponsored undergraduate degree during 2006-2009 as well as those students who are not sponsored. It takes a comparative approach which enables the researchers to see how the parties’ expectations differ from each other and investigate the following areas:

- students’ perception of sponsorship before coming to university,
- influence of sponsorship availability on students’ choice of university and programme,
- main factors for applying/not applying for sponsorship,
- main factors for offering/not offering sponsorship,
- main factors for choosing programmes to sponsor,
- impact of industrial sponsorship on the undergraduate programme,
- student expectations regarding future employment (main factors for accepting/rejecting a job offer),
- employers’ expectations from a future employee (main factors for offering permanent employment),
- relationship between students, academic supervisors, and company contacts,
- sponsorship application procedure,
- possible sponsorship scheme improvements, and
- factors that limit further collaboration in this area.
3.2.1 Measuring impact

As discussed in Chapter 2, measuring impact encourages organizations to be more realistic about their objectives and performance. It helps them to highlight benefits and implement advanced information provision and transparency. Impact includes negative or positive, planned or unplanned effects which could be short term or long term effects on a group of people, individuals or the organizations (Wainwright, 2006).

In this research, impact is used in terms of the values which students, academia and employers have gained from sponsorship and the difference that sponsorship is making in the stakeholders’ views, opinions, and achievements. A variety of quantitative and qualitative methods were used to estimate the ‘impact’ and identify changes which happened as a result of sponsorship. The parties’ views on sponsorship’s benefits and disadvantages and whether it impacts quality and quantity of the undergraduates engineering students were explored. The perceptions of each group were triangulated with the perception of the other group in order to get a detailed and balanced picture of the situation. In fact, the information provided evidence to show how the expected changes are happening in reality. The stakeholders were asked what happened to them as a result of sponsorship to find out the expected and unexpected short-term and longer-term impacts of the schemes. The indicators were used to discover advantages and disadvantages from sponsorship and subsequently how the schemes can be changed to create the most effective outcomes. Both objective and subjective outcome indicators were used in designing questions. Table 3-1 shows the example questions.

Measuring the impact of sponsorship is a long process, and it needs at least 4 to 5 years to monitor and study specific groups of the parties and collect longitudinal data. In this research, it was possible to survey a group of students in the first and fourth year of their studies to monitor how their attitudes change over the time and how the reality of sponsorship meets their expectations after spending some time in their sponsoring companies.
### Table 3-1: Example questions

<table>
<thead>
<tr>
<th>Question</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you feel you have benefited from the sponsorship scheme?</td>
<td>[ ] Not at all  [ ] Very little  [ ] A little  [ ] In some ways  [ ] Quite a lot  [ ] Considerably</td>
</tr>
<tr>
<td>Would you encourage other students to take up sponsorship?</td>
<td>Yes ☐  No ☐</td>
</tr>
<tr>
<td>Were there any disadvantages with the sponsorship?</td>
<td></td>
</tr>
<tr>
<td>Please indicate the role of sponsorship element of your programme in gaining each of the following:</td>
<td>![Table with ratings from 1 to 6]</td>
</tr>
<tr>
<td>How well did the sponsorship scheme support the learning outcomes of your degree programme?</td>
<td>[ ] Not at all  [ ] Very little  [ ] A little  [ ] In some ways  [ ] Quite a lot  [ ] Considerably</td>
</tr>
<tr>
<td>Have you received a permanent job offer from your sponsor (or any other) company?</td>
<td>Yes ☐  No ☐</td>
</tr>
<tr>
<td>Please indicate how important each of the following are in offering sponsorship.</td>
<td>![Table with ratings from 1 to 6]</td>
</tr>
<tr>
<td>In general, does the reality of sponsorship meet your expectation?</td>
<td>Yes ☐  No ☐</td>
</tr>
</tbody>
</table>
Table 3-1: Example questions- continued

<table>
<thead>
<tr>
<th>Question</th>
<th>1= Not at all</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>In your opinion, do you think there are any barriers which prevent more students to apply for sponsorship?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>What can Departments and employers do to overcome the barriers?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you think offering sponsored undergraduate programmes would improve:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Your graduate recruitment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quantity of graduate engineers</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Quality of graduate engineers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality of university programme</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comparing the results from the sponsored groups with other groups in the population was another approach taken to measure the impact on students. Different groups of students with and without sponsorship (including placement students) in different stages of their studies were chosen to compare their views about sponsorship with other types of students-employers links. The results potentially enabled the researchers to address a broad range of research questions directed toward perceptive facts such as students’ experiences and achievements from being/not being sponsored and the correlation of sponsorship and students’ employability. Finally, a group of recent sponsored graduates was surveyed to find their views on the experience of sponsorship and its impact on them as individuals.

Evidence has also been gathered from sponsoring and non-sponsoring employers, and departments with and without sponsored programmes, to explore the perception of different industrial engagements with University and students. This approach enabled the research subsidiary questions such as benefits to departments and industry from long term relations in comparison with other links and impact of industrial sponsorship on the quality of engineering graduates to be addressed.
3.2.2 Subject population

The initial project’s scope was undergraduate students in the Civil and Building Engineering department at Loughborough University with a view to disseminate practice across the other engineering departments at the university. However, Southampton University, the Institution of Civil Engineering (ICE), and AutoCRC agreed to take part in this project as they also operate their own sponsorship scheme.

ICE provides the QUEST undergraduate scholarship to support and encourage education in civil engineering in the UK. AutoCRC is the Cooperative Research Centre for advanced automotive technology in Australia. AutoCRC sponsors undergraduate final year projects within the automotive industry as part of their degree studies. The results of these surveys allowed a comparison of students’ views and expectations of sponsorship with the results of the UK students.

The Consulting Engineers and Contractors, Manufacturing Engineering and Systems Engineering sponsoring companies, AutoCRC partner companies, and the academic staff at engineering departments in Loughborough University were also invited to take part in this research to express their views on sponsorship.

a) Student study,

The following groups of students (both sponsored and non-sponsored) have been surveyed:

a-1) Final year,

a-2) First year ,

a-3) Recent Loughborough University graduates,

a-4) Fourth year students of the 5 year MEng programme,

a-5) ICE Quest scholars, and

a-6) AutoCRC scholars.

b) Industry study,

Data have been collected from the following companies:
b-1) Companies who sponsor Loughborough Students on the MEng Civil Engineering, CEM, and CMQS degree programmes,

b-2) Companies who employ Loughborough MEng Civil Engineering Students for year out placements,

b-3) Companies who sponsor Loughborough MEng Manufacturing Engineering Students,

b-4) Companies who sponsor Loughborough MEng Systems Engineering Students, and

b-5) AutoCRC partner companies.

c) University study,

Data gathered from academic staff at the following engineering departments in Loughborough University:

c-1) Departments without sponsored programmes,

c-2) Departments with sponsored programmes, and

c-3) The industrial liaison officer in the faculty of Engineering in Loughborough University.

The data was collected between academic years 2006-2007 to 2009-2010. Appendix 1 contains the timeline followed for accomplishing this research project.

3.3 Philosophical background

The conceptualisation of research questions and the way research is carried out is based on the epistemological and ontological perspective of the researcher. *Epistemology* and *ontology* shape the theoretical foundation of how the world can be experienced, what forms knowledge, and what can be done with that information (Walliman, 2006; Trochim and Donnelly, 2008).
Epistemology is the philosophy of knowledge or of how we come to know. There are two main and opposite approaches: Positivism and post-Positivism (Walliman, 2006; Trochim & Donnelly, 2008).

- Positivism is the basis of science and engineering which assumes that the world exists and is knowable as it really is (Cohen and Manion, 2000). It aims to establish cause and effect. The positivists believe that observation and measurement is the centre of the scientific attempt and the goal of knowledge is basically to explain the phenomenon that we experience. Observation and experiment enable the observers to gain data about this real world and identify regularities and laws which can be used to explain, predict and control the behaviour of particles or people. Positivists are realists, who believe that the goal of science is to uncover the truth (Walliman, 2006; Trochim & Donnelly, 2008).

- In the 20th Century, it became gradually more recognised that the original formulation of positivism was not sufficient. Although it was accepted there is a ‘real’ world which can be objectively known, many of the facts were not observed but deduced. Explaining the real world in terms of simple cause-effect was replaced by probabilities. The post-positivism perspective believes that there is a real world relatively independent of observers but it is complex and multi-causal and there are limits on what we can know about it. Post-positivism assumes that the world exists but different people construe it in very different ways (Cohen & Manion, 2000). It aims to reveal interpretations. Post-positivists are critical realists who know that all observation and measurement are fallible and have error and that all theory is revisable. Therefore, they highlight the importance of multiple measures and observations and the need to use triangulation across these multiple sources to obtain more valid results (Walliman, 2006; Trochim & Donnelly, 2008).

Ontology deals with questions concerning what exists to be investigated. It considers whether there is a ‘real’ world independent of our perceptions and knowledge of it. There are two main and opposing approaches: Objectivism and Constructivism.

- Objectivism holds that reality exists independent of awareness and social actors.
• Constructivism holds that social phenomenon is entirely dependent on social relations therefore they are in a constant state of change. The observers construct knowledge by their observations of the world and create their own meanings of the world, based on their experience and backgrounds. How the individuals make meaning of the world may be different from how the other observers understand the world (Walliman, 2006; Trochim & Donnelly, 2008).

3.3.1 My position

This study is informed by a post-positivist epistemology and constructivist ontology. My view is that the world is real and my presence does not have that much effect on it. I can investigate it by observing, experimenting and constructing meaning of it. This world is complex and multi-causal which means there could be hundreds of causes for each effect.

I believe that we each create our view of the world based on our perceptions of it. Because not all individuals can see the world perfectly as it really is, perceptions and observations are fallible. We are all biased and our observations are affected. Therefore, triangulation across multiple fallible perspectives provides a more detailed and balanced picture of the situation. The high degree of inter-subjective agreement provided by triangulation of the results is seen as close as one can get to ‘objectivity’ in this field. Such is the case when all the stakeholders agree that sponsorship is a good practice in the education of undergraduate students.

3.3.2 Ways of reasoning

In research, the two broad methods of reasoning are often referred as the \textit{deductive} and \textit{inductive} approaches.

• Deductive reasoning works from general statements and comes to a specific conclusion. It is narrower in nature and is concerned with testing or confirming hypotheses.

• Inductive reasoning starts from specific observations and measures to broader conclusions and theories. Inductive reasoning is more open-ended and exploratory.
However, most social research involves both inductive and deductive reasoning processes at some time in the project (Walliman, 2006; Trochim & Donnelly, 2008).

This research combines inductive and deductive approaches to examine different aspects of the research problem. It involves deductive reasoning processes at some points in the project to test some hypothesis. Quantitative techniques were employed to collect data that is numerically based and open to such analytical methods as statistical correlations to test or confirm some hypotheses.

This study also employs qualitative techniques which rely more on language and the interpretation of its meaning to explore some areas more thoroughly in order to develop some specific guidelines and conclusions that can be tested in future research.

### 3.4 Research strategy

Qualitative and Quantitative research are two main approaches to research methodology in social sciences. Choosing the research approach and technique depends on the topic being studied and the required information (Naoum, 2007). Pedagogical research uses both quantitative methods and qualitative approaches. These include case studies, survey research, and statistical analysis. Qualitative research also provides theories that can be tested by further quantitative research.

#### 3.4.1 Qualitative research Vs Quantitative research

Quantitative research is ‘objective’ in nature. It is based on scientific theories, measured with numbers, preferably laboratory based, and responses controlled by the researcher. Quantitative approaches focus upon hypothesis testing and statistical analysis of data, which can be employed for measuring impacts. Quantitative data are based on actual measurements with numerical meaning. Their reliability and validity are based on statistics.

However, qualitative research is ‘subjective’ in nature and used to deepen personal understanding theories. It emphasises judgement and investigates opinions, feelings and the ways people see the world. It is based on understanding of human behaviour,
feelings, and experiences and provides rich and deep information. In this approach responses are controlled by participants. Participants have the opportunity to explain why they responded to a multi-choice question the way they did. Linguistic consistency and triangulation are used for testing reliability, and it is validated by agreement with the respondent (McQueen and Knussen, 2002; Brown, 2005; Naoum, 2007).

### 3.4.2 Combining Qualitative and Quantitative Methods

A qualitative approach explores the ‘why’ and ‘how’ of a research question and provides extra information and better understanding of respondents’ thoughts and feeling, as compared to ‘what’, ‘where’, and ‘when’ of quantitative research, which is used to gain the measurement of impacts (Naoum, 2007). Research in social science can be thought of as mixed methods of both Qualitative and Quantitative methods.

> ‘The difference between Quantitative and Qualitative research may be described as big “Q” research. In between is little ‘q’ research, which is primarily non-numerical, partially research-controlled and may be used for hypothesis-generation. Pedagogical research uses both big ‘Q’ research and little ‘q’ approaches’ (Brown, 2005).

The qualitative data enables the researcher to answer certain research questions, whereas quantitative data is appropriate for answering others. If the results from the qualitative approaches support the results from quantitative approaches, then there will be accordant validation about the results.

This research uses a mixed-methods design, in which both qualitative and quantitative methods such as questionnaires and interviews have been employed to gather data and evidence. The qualitative methods have been used to gain a general sense of phenomena and to form themes that could be tested using further quantitative research. For instance, qualitative research was used to gain better understanding of why respondents gave particular answers. The quantitative approaches were used to gain the measurement of impact including the assessment of attitudes, values, and perception of individuals.
A variety of data from both sources were used to estimate ‘impact’ and develop a fuller understanding of the phenomenon under investigation. The core of the study is the parties’ views of sponsorship and the benefits derived from it. In addition, the research includes the data from students, academic staff and employers who are not involved in the sponsorship schemes in order to compare their views with those who are involved in the schemes. Data were gathered from closed and open-ended questions, interview transcripts, audio recordings, and documents (reports, meeting minutes, and module information). All these data have then been brought together to determine the research objectives and develop a model of good practice. The relationship between research aim, objectives, thesis chapters and methods is outlined in Figure 3-4.

![Figure 3-4: Relationship between research aim, objectives, thesis chapters and methods](image-url)

- **Methods & datasets**
  - QUANT & QUAL Questionnaire
  - QUANT & QUAL Interview
  - QUANT & QUAL Interview & Questionnaire

- **Thesis chapters**
  - Chapter 5: Academia study
  - Chapter 7: Triangulation & discussion

- **Objectives**
  - determining:
    - incentives of involvement in sponsorship
    - advantages and disadvantages of the sponsorship schemes
    - barriers that limit further collaboration

- **Research aim**
  - strategies for future developments

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3.5 Data collection methods

Surveys, case studies, experiments, archival analysis, and histories are five major research strategies used in the social sciences. Choosing the research strategy depends on the research question. For example, case studies and experimental strategies answer the “how” and “why” form of research questions, and surveys answer the “who, what, where, how many, and how much” forms (Yin, 2009). Surveys can be divided into two broad categories: the questionnaire and the interview.

The advantages of survey techniques include:

- they are effective way of collecting information from a large number of respondents within a limited time frame,
- a wide range of information can be collected to study attitudes, values, and beliefs, they are relatively easy to administer (Naoum, 2007).

However, surveys depend on participant’s motivation, honesty, and knowledge and sample size may not represent the whole population (Sapsford and Jupp, 2006; Parajuli, 2008).

In this research, surveys were chosen as the research strategy to answer the “how, why, who, what, how many, and how much” forms of research questions. They are effective ways of collecting information from a large number of respondents within a limited time frame. Data were gathered using interviews, questionnaires, review of documents and observations.

The students’ questionnaire was used as the base for other questionnaires to ensure consistency across the main data collection. For example, all the parties were asked the core questions about the sponsorship schemes’ benefits and any disadvantages. Therefore, it is possible to see how the parties’ views differ from each other. However, each of the questionnaires includes questions targeted on the particular groups.
3.5.1 Questionnaire

Questionnaires are the most broadly used data collection methods in educational research, which help gather information on knowledge, attitudes, opinions, behaviours, facts, and other information (Radhakrishna, 2007).

Questionnaires in comparison to some other types of surveys are quicker and less expensive, they can be distributed in large numbers at one place and time, and they are private and confidential, which encourage more candid and honest responses (Bryman, 1989). Questionnaires can also be conducted online and be sent to a large sample in different places. In this case, there is no data entry required, the data is cumulatively stored and ready for analysis, and the researcher controls response rate instantly and has access to instant partial results. The Bristol Online Survey is a useful electronic package for conducting online questionnaires (www.survey.bris.ac.uk).

However, the lack of interaction between researcher and participant, and low response rate in some cases are some disadvantages of questionnaires (Brown, 2005; Kulej, 2007; Naoum, 2007).

In this research, by considering the number of students and the amount of information needed about their views on the sponsorship element of their programme, both paper-based and online format questionnaires were designed and used as data collection methods.

Questionnaires were designed in leaflet format using Microsoft Publisher to look neat, professional, and encouraging. General instruction was given as an opening to the questionnaire and the response method was indicated. Also, specific instructions for particular question structures were provided. In addition, suitable spacing and font style were used to separate instructions and questions and make the reading and understanding of the instructions easy. Response ranks were kept in the same sequence to speed up completion and also avoid accidental error of responses. A clear introduction explained the aim of the research and data protection policy and acknowledged the respondents. Questionnaires started with a demographic section to give the respondents an easy start and provide practice in answering upcoming questions and finished with a further “thank
you” and contact details. More thought was given to avoid unnecessary questions and keep the length of the questionnaire to a moderate size. The questions were kept short, simple and to the point.

Paper-based questionnaires were distributed in classrooms of students and online questionnaires were created using the Bristol Online Survey (http://www.survey.bris.ac.uk/) and circulated through emails during 2006 to 2009. The survey divided into five sections and the maximum number of questions asked was 24, which should have taken around 15 minutes to complete. A copy of the questionnaires can be found in Appendix 2.

3.5.1.1 Questionnaire structure

Question type

Different types of questions can be used, namely ‘open – ended’ and ‘closed’, which can include single and multiple responses, scales and rating, or rank order questions.

Open-ended questions provide qualitative data and respondents can give information to clarify their answers. They are useful when the full range of responses to a question is not known and there are many response categories. However, participants have the opportunity to say whatever they like so analysis is much more difficult and time consuming. In addition, useless or irrelevant information as well as valuable information might be collected. Finally, as they need greater time and effort from the respondent, they may lead to a lower response rate.

Closed questions are questions followed by a list of answers, and they provide quantitative data. They are reliable and easier to answer and are more likely to provide the exact information that is being sought for the specific research. They are also easier to code and analyse. They are useful when categories are distinct and relatively few in numbers, but they may not include some information as a presented response group or the category is not exactly what respondents wanted to say. Another disadvantage is that it is easy for respondents to answer randomly (Burgess, 2001; McQueen & Knussen, 2002; Naoum, 2007).
**Rating scale**

The Likert Scale is often used in questionnaires allowing respondents to indicate their level of agreement with a statement. Odd and even numbers can be used as the number of points of a rating scale. Odd numbers of points on the scale provide a neutral option but with even numbers of points the middle point is not available and a respondent would be forced to choose. This allows the data to be broken down into positive and negative categories rather than be neutral (Brown, 2005).

**Response rate**

Response rate is the proportion of the selected sample that complete the questionnaire. Response rates usually are in the 30-40% range or less (Punch, 2003), and for online questionnaire in the 20-30% range (Kulej, 2007). In a low response rate, the received responses might not be representative of the whole population. Clearly, it is better to have a good response rate of at least 60% (Punch, 2003). Planned access to respondents, planned procedures for return, and a questionnaire’s appearance, layout, and length all influence response rate (Punch, 2003). Also with online questionnaires the following could improve response rate:

- time of survey,
- easy access,
- length of the survey,
- sending follow up messages,
- advertising the survey during classes, also by flyers and posters on campus,
- by not ‘over surveying’ students, and
- encouragements in the form of prizes, … (Kulej, 2007).

A clear and explicit instruction for completion of questionnaire must be provided. The efficient and professional appearance will encourage further consideration of participants and increase the response rate (Walonick, 1993).

In this research, structured questions, semi-structured questions, and open questions were used in designing the questionnaires. Structured questions provide a set of choices for
the respondents to choose from. An “Other” category was also considered for these questions to enable the respondent to add the categories that they might have in mind and not been presented in the list.

A six-point rating scale was used in measuring and analysing responses. The first thought was to use a ten-point rating scale to gather more perceptive data. However, by considering the difficulty of the labelling of the individual points and the confusion that might be caused, it was decided to choose the six-point rating scale. This was easier to label the points (but still with some difficulties!) and also gives more efficient discrimination between positive or negative views of students rather than neutral views (Brown, 2005).

Semi-structure questions give the opportunity to the respondents to answer to a specific question and then give their thoughts and views, for example:

“Would you recommend this scheme to other students?”
☐ No ☐ Yes

Please, list the reasons for your ‘Yes’ or your ‘No’.

In addition to the quantitative data, respondents were able to add qualitative statements in response to open ended questions such as, ‘How could the sponsorship scheme be improved?’, ‘What have you gained most from the sponsorship scheme?’, ‘What benefits do you think your sponsor company has gained from the sponsorship scheme?’, and ‘What extra support could be giving in order to help you to obtain sponsorship?’ The questionnaires were reviewed by the research supervisors and the pedagogic research consultant and pilot tested with a group of 24 students.

After analysing the first survey results, the questionnaires were revised. One example is that some of students expressed that they did not have a clear understanding of the sponsorship scheme. It was not clear if they were not aware of the scheme, or they did not have enough information about it, and the following question was added to the second series of the survey: “Were you aware of the sponsorship scheme before coming to university?”
3.5.2 Interview

Interviewing is another technique for collecting information and opinions. It is a more personal form of research than questionnaires in which the interviewer works directly with the respondent. Interviews can be conducted in three forms: unstructured, semi-structured and structured (Naoum, 2007). Unstructured interviews use ‘open-ended’ questions and are an exploratory exercise. Semi-structure interviews are more formal than unstructured interviews. They use both open-ended and closed questions and the interviewer can explore various areas and raise specific queries during the interview. The respondents are able to express their views. Structured interviews use the same questions with the same order for all interviewees. They may start with some ‘open’ questions but the main format is the use of closed questions. They are based on a carefully worded interview template and require short answers or the answers being ticked off. The respondents do not have the opportunity to express their views fully.

Structured interviews require statistical analysis and are part of the quantitative perspective. Semi-structured questions and in-depth interviews require qualitative analysis.

The main advantages of interviews are:

- interaction between interviewer and respondent resulting in accurate information,
- the interviewer has the opportunity to probe or ask follow-up questions,
- the quality of information is deep and detailed, and
- interviewer has a high level of control over the interview process.

High cost, long process time (need to set up time and venue), small sample, geographic limitations and difficulty to process the data are some of the disadvantages of interview. The data process and analysis are also time-consuming (Brown, 2005; Naoum, 2007).

At the second stage of this project, data collected from academic staff and employers was used to find out about their experiences, expectations and views on sponsorship during 2007-2008. Interviews were chosen as the data collection method in order to ask in-
depth questions and gain rich information and an understanding of the underlying reasons and motivations for their attitudes and preferences.

The interviews were conducted in a semi-structure format with a mixture of closed and few open questions. Considering the number of questions (24) and the type of some questions which required short answers, the interviews were designed based on a carefully worded interview schedule containing open questions for the respondents to express their views at length. Questions were designed with the same structure as the questionnaires (section 3.5.1.1 Questionnaire structure).

The study began with 11 interviews with senior managers in the UK construction industry. The interviews were undertaken on a personal one-to-one basis at the interviewees’ workplace and in Loughborough University and the average time was 40 minutes per interview. The questions were sent to the interviewee prior to the interview.

All the interviews started by introducing the researcher and the purpose of the interview and assuring the interviewee of anonymity and right to withdraw from the research. Then permission was requested to record the interview. The interviewee was offered the opportunity to ask questions and also to review the final results of the research. The interview with each of the sponsoring companies was divided into five sections (A copy of the interview template can be found in Appendix 3).

Having conducted 11 interviews with a cross section of employers and finding the responses were broadly similar it was decided that the remaining employers would be surveying by mean of the online industry questionnaire. Twenty four questionnaires were sent out and all questionnaires were completed and submitted. Twenty four of the participants are member of the sponsorship consortia, 6 are not members but they employ Loughborough students for year out placements and 5 are AutoCRC partner companies.

Seven academic staff within the Faculty of Engineering in Loughborough University were also interviewed. The interviews were conducted in the offices of the participants and ranged from 30 to 50 minutes.
The interviews sought to gain information in four main areas:

- industry incentives to be involved in sponsorship,
- graduates’ skills from industry and academic point of view,
- the benefits, strengths, weaknesses of the schemes and possible improvements, and
- sponsorship support of graduates’ employability skills.

Additional questions were developed to explore each of these areas further. A copy of the interview schedule was sent to the interviewees in advance and during the interviews, probing questions were asked when it was felt necessary to explore a topic in more depth, or to clarify a particular issue.

3.5.3 Other data collection methods

Additional information about employers’ and academic staff’s views regarding sponsorship schemes were collected by attending and observing various meetings. Document review was also used as a way of collecting data by reviewing existing documents. The following documents have been reviewed:

- The school of Mechanical and Manufacturing Engineering degree programme survey (Loughborough University),
- Civil & Building Engineering department sponsors/advisory committee meeting documents (Loughborough University),
- ICE QUEST scholarship applicant analysis,
- AutoCRC project flow, and
- Examination results of the final year students in the departments of Civil Engineering (Loughborough University).

These documents were reviewed to gather background information about the history, operation and evaluation of the existing schemes. Documentary analysis was also applied to the examination results of the final year students on the MEng Civil Engineering programme within the departments of Civil Engineering. The purpose of the
analysis was to find out if there are any differences between the sponsored students and the rest of the students in terms of their academic performance.

### 3.6 Ethical issues

Ethical issues must be considered in both qualitative and quantitative research (Speziale & Carpenter, 2007; Morón-García and Willis, 2009). Mirriam cited Stake (1994) which provides a brief guideline for the conduct of qualitative research:

'Qualitative researchers are guests in the private spaces of the world. Their manners should be good and their code of ethics strict' (Merriam, 2009).

The researcher must make sure the rights and privacy of the participants are complied with. There are a number of main ethical issues in social research to protect the rights of the research participants such as: voluntary participation, informed consent, risk of harm, confidentiality, and anonymity (Walliman, 2006).

Reports and published documents should be anonymised and the participants should have access to the reports. The respondents should be offered contact information in case they need to reach the researcher. The data should be stored in a secure place and information should also be kept confidential.

The participants must be treated fairly and with dignity and their interests must be protected. They must be given the opportunity to make an informed decision about their participation. Informed consent should always be obtained according to the standard and conditions of the organisation and the consent process should be monitored.

The following explanations should be given to the participants:

- the purpose of the survey,
- the expected duration of the participant’s role,
- the confidentiality of participation,
- the right of withdrawal at any time and requesting for their data be destroyed, and
- whether follow up will be required.
If the research includes vulnerable populations and data is principally sensitive, a statement should be included granting permission for the usage of data and the statement needs to be signed by the parties (Burgess, 2001; Oliver, 2003).

All research conducted at Loughborough University which involves human participants, must obtain approval from the Ethical Advisory Committee (EAC). The type of approval required depends on the extent of any physical, sociological or emotional risks to participants. An ethical clearance checklist needs to be completed for all investigations involving human participants in the following areas: investigators, participants, methodology/procedures, observation/recording, consent and deception, withdrawal, storage of data and confidentiality, and incentives.

If the research involves working with the vulnerable groups or procedures which are likely to cause physical, psychological, social or emotional distress to participants, additional information and full application should be submitted to the EAC. Otherwise, if there is no more additional information or full proposal required for any of the above sections, the completed checklist is lodged with the head of the department by students and supervisors.

In this research, no additional information or proposal application form was needed and copies of ethical clearance forms were completed and lodged with the engCETL.

Each person surveyed was assured of confidentiality and right of withdrawal from the research at any time and calling for their data to be destroyed. Participants were encouraged to take part in the research but there was no pressure on them for doing this. All research participants were fully informed about the procedures, and they gave their permission to participate and for interviews to be recorded. The audio recordings are stored securely and will be destroyed when the research is completed. They were assured there is no risk of harm (physically and psychologically) as a result of their participation in this research. All participants had the right to choose to give their ID numbers for follow up studies. They were assured that identifying information will not be made available to anyone who is not directly involved in this study and that the participant will remain anonymous throughout the study and in all the publications. All reports and
published documents are anonymised and the participants allowed access to the reports. No incentives were offered to the participants as an inducement to participate in the research.

In regard to research integrity, all cited works have been referenced, a description of research methodology has been provided (this chapter) and the research limitations explained in the final chapter.

### 3.7 Statistical Analysis

Data analysis relies on the research questions and the purpose of the study and in fact, the findings are framed accordingly to answer the research questions. The researchers need to clarify if there is any conflict between the founding from different sources. In case of conflicting exits, supporting evidence should be provided to explain either of the argument (Speziale & Carpenter, 2007).

Analysis can be undertaken within most questionnaire packages. More complex analyses will require transfer to a statistical package, such as Statistical Package for the Social Sciences (SPSS).

There are three main data analysis steps:

- summarising and reducing data - creating the variables,
- descriptive level analysis - the distribution of the variables across the sample, and
- relationship analysis - relationships between the variables – first bivariately, then (as appropriate) jointly (Punch, 2003).

Quantitative data analysis is based on statistics. The main forms of statistics are:

- descriptive - tables, pie charts, histograms, etc.
- summary - means, modes, medians, etc.
- inferential - drawing conclusions from data and identifying whether the sets of data are similar or different.
Qualitative data analysis converts the qualitative data into some form of explanation and interpretation of the participants and the investigated situations. The process involves classification of data and identification of the themes. Then themes are combined to identify categories and patterns that require further investigation. Then theories and guidelines could be drawn from the data (Strauss and Corbin, 1990; Auerbach, 2003).

There are computer programmes available for analysing qualitative data but these can be awkward to use. A computer-based approach is not always sensitive to perspectives and details expressed in the responses to open ended questionnaires and interviews. For small samples, it is easier to analyse by reading the responses, categorising, checking and re-categorising if necessary. Checking the categories or themes by an independent observer provides an estimate of the validity of the categories and the reliability of the categorization (Brown, 2005).

In all statistical analysis packages data can be entered directly or imported from other packages such as Spreadsheets. Usually the data is presented in a data table where each row represents a ‘case’, and each column represents a specific variable and its data for all respondents. A case is a specific respondent and respondent’s data. Variables specify the data collected by question on the questionnaire. Each question may be presented by one or more variables (Burgess, 2001).

A variable has a unique title and a specific level of measurement which are (Burgess, 2001; Brown, 2005):

- **Nominal**: In this classification, names are assigned to objects as labels. Equality and difference are the only comparisons that can be made between variable values. There is no "less than" or "greater than" relations among the classifying names.
- **Ordinal**: In this classification, the numbers assigned to objects represent the rank order of the entities measured. Comparisons of greater and less can be made, in addition to equality and inequality. However, operations such as conventional addition and subtraction are still meaningless.
• Interval: The numbers assigned to objects have all the features of ordinal measurements, and in addition equal differences between measurements represent equivalent intervals.

• Ratio: The numbers assigned to objects have all the features of interval measurement and also have meaningful ratios between arbitrary pairs of numbers. This is most commonly associated with measurements in the physical sciences. The zero value is not arbitrary and units are uniform. This is the only measurement type where ratio comparisons are meaningful. In SPSS the interval and ratio levels are put together and called scale.

From a statistical perspective interval-level variables are the most desirable. As they express much more information about cases and their relation to one another than does a nominal or ordinal variable. However, many social science variables are not interval and cannot be measured at the interval level (e.g. ethnicity, religious group, gender, family type) (De Vaus, 2002a; Urdan, 2005).

Parametric statistics are used for the ratio level and non-parametric statistics are used for nominal, ordinal and interval. Non-parametric methods are broadly used for studying populations that take on a ranked order, for example, when assessing preferences or satisfaction for data on an ordinal scale. The non-parametric statistics are preferable, since they do not make strong assumptions about the shape of the underlying distribution. Due to the dependence on fewer assumptions, their applicability is much wider than the corresponding parametric methods. In particular, they may be applied in situations where less is known about the application in question. In many cases non-parametric methods are easier to use and minimize the improper use and misunderstanding (Rose and Sullivan, 1996; Wasserman, 2006; Corder and Foreman, 2009).

The most frequently used tests include Chi-Square Test, One-Sample Kolmogorov-Smirnov Test, Two-Independent-Samples Tests, Two-Related-Samples Tests, Tests for Several Independent Samples, and Tests for Several Related Samples.

The non-parametric tests for multiple independent samples are used for determining whether or not the values of a particular variable differ between two or more groups. The
Mann-Whitney U test is the most popular of the two-independent-samples tests and the Kruskal-Wallis H test is an extension of the Mann-Whitney U test which is used for testing the null hypothesis (H0) that multiple independent samples come from the same population (SPSS Inc., 2006).

The non-parametric tests generate a \( p \) value, which is used as a measure of the strength of the results of the test to reject or accept the H0. If the \( p \) value is less than the significance level, then the null hypothesis is rejected and therefore, the results from two or more different groups are significantly different. Typical values of the significance level are 5% (0.05), 1% (0.01) and 0.1% (0.001).

In this research, the analysis of the data has been done using Statistical Package for the Social Sciences (SPSS 15.0) and Microsoft Excel. The quantitative data was analyzed for descriptive statistics (frequency, percentage, mean, and reliability scores) and visualized through tables and diagrams. Nonparametric tests were carried out to determine the existence of significant differences between sectors of the samples.

Data have been collected from different groups of students, academic staff and employers. In order to determine whether or not the values of a particular variable differ between two or more groups, non-parametric tests for multiple independent samples were used (Mann-Whitney test for two groups and Kruskal-Wallis test for more than two groups). In reporting the results, if there was no difference across the groups, the results were reported without mentioning a specific group’s name and the findings are valid for all the groups. However, where the results from different groups were not similar, the results of each group were separately presented with mentioning the specific group’s name.

The \( p \) value was used as a measure of the strength of the results of the test to reject or accept the null hypothesis (H0) and the significance level was considered 0.05. The results have also been flagged with a single asterisk when the \( p \) value is less than 0.05 and with two asterisks when the \( p \) value is less than 0.01, and three asterisks when the \( p \) value is less than 0.001.
If the \( p \) value is less than 0.05, then the null hypothesis is rejected. For example, the Mann-Whitney test was conducted to examine if there were significant differences between first and final year students’ view about the importance of financial aid availability. In this case, \( p \) value was 0.01 which states there is a statistically significant difference between first and final year students’ results.

The qualitative data were analyzed by using content analysis and interpretation of the results for creating categories according to frequency. The analysis utilized categorizing data by triangulating themes and information from the open-ended survey questions and interviewees’ responses and quotations. After completing the data entry, organizing the data and analysing them inductively, strong categories of responses became obvious. These categories were presented in a descriptive form including quotes from the participants.

The first step was listening to the audio files, reading the transcripts and making note of the frequent themes which were expressed with the same or similar words by different research participants. Then, the themes were organized, refined and merged to develop the final response categories. Table 3-2 illustrates the repeating themes for one of the categories, “recruitment source”, constructed for the data in companies’ achievements from the sponsorship scheme question.

<table>
<thead>
<tr>
<th>Category</th>
<th>recruitment source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequent themes</td>
<td>qualified graduates</td>
</tr>
<tr>
<td></td>
<td>visible stream of talent</td>
</tr>
<tr>
<td></td>
<td>supply of motivated high quality graduates</td>
</tr>
<tr>
<td></td>
<td>good quality committed workers</td>
</tr>
</tbody>
</table>

3.7.1 Level of measurement

Measurement includes assessment of attitudes, values and perception of individuals in surveys (as explained in Chapter 2). There are typically three levels of measurement in SPSS that are defined as: nominal, ordinal and scale. Table 3-3 shows examples of the measurement levels in this research.
Table 3-3: The measurement levels in this research

<table>
<thead>
<tr>
<th>Nominal</th>
<th>Ordinal</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Used for classification data with no ordering, e.g. Gender, sponsorship status, job offer/acceptance, degree programme, etc.</td>
<td>Used for ordered data where differences between values are not important, e.g. Likert scales on which participants are asked to rank on a scale of 1…6 their degree of satisfaction, agreement etc.</td>
<td>Used for ordered and constant data, e.g. age.</td>
</tr>
</tbody>
</table>

These levels refer to the relationship among the attributes for a variable. For example, the “sponsorship_status” variable has two attributes “sponsored” and “non-sponsored”, and the level of measurement (relationship) among these attributes is nominal.

### 3.7.2 Validity and Reliability

Validity is concerned with whether the findings and results are really consistent with the subject being investigated and also discusses suitability of data collection methods (Saunders et al., 2000). There are several ways to assess validity. The validity of research increases by a number of various sources of evidence which enables the researcher to gain multiple measures of the same phenomenon. Different sources are highly complementary and a good research is dependent on the diverse sources (Yin, 2009).

The statistical validity can be used for assessing validity of quantitative data and validity of qualitative methods can be determined by agreement with participants (consensual validation/triangulation) and success in transfer to other contexts (De Vaus, 2002b; Auerbach and Silverstein, 2003; Brown, 2005).

The following procedures can be used to assure validity:

- take other researcher’s opinion,
• use of peer examination,
• use of triangulation,
• compare how people answered the new measure of a concept, with existing, well accepted measures of the same concept, and
• evaluate a measure by how well the measure conforms with theoretical expectations.

However, there is no ideal way of determining the validity of a measure. The method chosen will depend on the situation (Merriam, 2002; De Vaus, 2002b).

Reliability indicates the accuracy or precision of the measuring instrument (Norland-Tilburg, 1990). A reliable measurement is one where the same finding will be obtained if the research was repeated at another time by another researcher. If the same finding can be obtained again, the instrument is consistent or reliable (Merriam, 2002; De Vaus, 2002b).

The following strategies can be used for estimating reliability:

• test-retest reliability, which calculates a reliability estimate by administering a test on two occasions and calculates the correlation between the two sets of scores,
• equivalent forms reliability, which calculates a reliability estimate by administering two forms of a test and calculates the correlation between the two sets of scores, and
• internal consistency reliability, which calculates a reliability estimate based on a single form of a test administered on a single occasion using internal consistency equations.

The internal consistency strategy is the easiest logistically because it does not require administering the test twice or having two forms of the test. The most frequently reported internal consistency estimate is the Cronbach alpha (Brown, 2002). Cronbach alpha is used to estimate the proportion of variance that is systematic or consistent in a set of test scores. It can range from 0 (if no variance is consistent and representing an instrument with full of error) to 1 (if all variance is consistent and representing a total absence of error). For example, if the Cronbach alpha for a set of scores turns out to be
0.90, it could be interpreted as the test is 90% reliable (Brown, 2005; Radhakrishna, 2007).

The higher the Alpha is, the more reliable the test is. A reliability coefficient (alpha) of 0.70 or higher is considered acceptable reliability in most social science research situations (Nunnally, 1978). It should be noted that the true reliability can only be estimated not calculated (Trochim & Donnelly, 2008).

In this research, the single-administration method was employed to estimate the reliability. Cronbach’s alpha which tends to be a high estimate of reliability was chosen to estimate the quality and consistency of the surveys’ multiple choice questions. It was used to calculate the average correlation among the responses that were collected at the same time. A reliability coefficient of 0.70 or higher was considered “acceptable”.

Cronbach’s alpha determines how well a set of variables measures a single unidimensional latent construct. Thus, if data are multi-dimensional, Cronbach's alpha will be low for all items. In this case, factor analysis was run to group items according to their dimensions, and then the alpha was calculated for each subset of items separately.

Validity was judged by taking professionals’ opinion on the questionnaires and their opinions reflected on the design to make sure the questions were related closely to the research questions. Pre-testing of the questionnaires was also done to find any observable problems in the questionnaires.

Several sources of evidence were used to obtain multiple measures of the same phenomenon and triangulation was used to utilize how the research findings match with each other. Interviews, observations, review of the documents, and questionnaires were exploited to gather evidence from multiple sources such as different groups of students in different years, academic staff and employers. In this research three cross section studies were carried out and data were gathered from 13 groups of the first and final year students in three years between 2007 and 2009. The result of the each group of students in 2007 was compared with the results of the students in the following year (for example, the first year students’ results in 2007 were compared to the results of the first year
students in 2008 and 2009). Also, the measurements were evaluated by how well they are confirmed by theoretical expectations.

3.7.3 **Triangulation in research**

Triangulation is a method of cross-checking data from multiple sources and gives a more detailed and balanced picture of the situation and it is used in both quantitative and qualitative studies. It is used to check the results gathered from different sources in order to enhance confidence in the subsequent results (Bryman, 2001).

Cohen et al. (1986) define triangulation as an

> "attempt to map out, or explain more fully, the richness and complexity of human behaviour by studying it from more than one standpoint" (Cohen et al., 2000).

Combining of several research methods and sources in the study of the same phenomenon increases the reliability and validity of research results. If the answer to one question obtained from different methods and resources are clashing, it means that the question or method needs to be reconsidered (Merriam, 1998; Speziale & Carpenter, 2007).

Triangulation could be performed in the following types or a combination of them (Denzin, 2006; Speziale & Carpenter, 2007):

- **Data triangulation**: it includes more than one source of data in a single investigation and researchers collect data at different points in time, at more than one site and/or from different set of individuals and groups.
- **Investigator triangulation**: it involves multiple researchers in an investigation.
- **Theory triangulation**: it involves using more than one theoretical scheme in the interpretation of the phenomenon.
- **Methodological triangulation**: it involves using more than one method to gather data.

In this research, data and methodological triangulation were used as a research strategy to ensure unity of findings and to confirm results. Different data collection and analysis
methods were combined to collect data from different groups of students, academic staff and employers from different engineering disciplines. Triangulation enabled the researcher to reveal the same information from more than one point and helped to describe the findings obtained under different circumstances. The information from different points was compared and contrasted, which assists to confirm the validity of the findings.

Findings from different data sources were triangulated and related to the relevant literature to get more valid results. For example, different groups of students were asked to rank the effect of availability of sponsorship on their choice of programme. The aim was to see if these respondents produced similar answers which give a more balanced picture of the situation, or if clashing answers are produced in which case the question needed to be reframed. Another data triangulation method used asking the same question from all the parties. This method allows assessing the results from different perspectives and increase the credibility and validity of them. For example, all the parties were asked about the benefits of sponsorship to students and triangulation of the results used to perceive the level of consistency in the research data.

Data-gathering methods were also triangulated in different ways. In this approach, a method is used in different ways to investigate a subject. For example, in this research, students’ questionnaire contained two different questions to measure the impact of availability of sponsorship on students’ choice of university/programme. In one question, they were asked to rank the importance of the availability of financial aid and sandwich placements (which are two of the main aspects of sponsorship) on their decision and in a separate question they were directly asked to rank the availability of sponsorship on their decision, so as to get a clear picture of the results obtained. In addition, methodological triangulation involved contrasting research methods, such as a questionnaire and interviews as well as combining the use of quantitative and qualitative methods. For example, students were asked to answer a closed question and rank the importance of listed factors in applying for sponsorship. They were then asked to answer this open ended question: “What do you expect to gain from sponsorship?” Triangulation of the results of these questions allowed determining how consistent the findings were.
3.8 Summary

This chapter has outlined and discussed the design and methodology of the research. The main data collection methods are questionnaire and semi-structured interviews, which were employed to gather evidence and measure the impact of sponsorship on the parties involved. The total set of data obtained from the students, academic staff and employers were compared to assess the degree of agreement between their views. Triangulation was used to explain the parties’ view on sponsorship by studying it from more than one perspective.

The analysis of the data has been done using SPSS and Microsoft Excel. The data were analysed in order to obtain descriptive statistics, and nonparametric tests were carried out to determine the existence of significant differences between sectors of the sample. The analysis included the assessment of attitudes, values, and perception of individuals in order to evaluate the benefits to the three stakeholders, assess the barriers that inhibit further sponsorship, and propose strategies for future developments.

Ethical issues were considered throughout the research and all requirements met and approval obtained from the Ethical Advisory Committee.
Chapter 4: Student study

A series of questionnaires was completed by undergraduate engineering students and graduates from the spring of 2006 to the autumn of 2009, to determine what impact sponsorship had on them. The results of this study are presented in this chapter.

As explained in Chapter 3, different groups of students with and without sponsorship and in different stages of their studies were chosen in order to compare their views about sponsorship as they move into, through, and beyond their degree programme. Statistical tests were conducted to examine if there were significant differences between the results of the different groups. If there was no difference across the groups, the results were reported without mentioning a specific group’s name and the findings are valid for all the groups. Otherwise, the results of each group were separately presented with mentioning the specific group’s name.

This chapter begins with an overview of the students’ profile. It then explores the students’ perceptions and expectations of sponsorship, the benefits derived from sponsorship by them, sponsorship influence on learning outcomes of degree programmes and student employability, and drawbacks and areas which need to be developed.

It continues by reporting recent graduates’ perception of sponsorship and its effect on them as individuals and their careers. Finally, this chapter will describe how the views of a group of students have changed over time by analysing the results of follow up questionnaires. The chapter summarises the influence of sponsorship on the students, in terms of their achievements in comparison with the other students and recommendations on how sponsorship schemes could be improved.
4.1 Profile of students

A group of 669 undergraduate students (both sponsored and non-sponsored) in the Civil and Building Engineering, Mechanical and Manufacturing Engineering, and Systems Engineering were surveyed. In addition, follow up surveys were carried out with 20 recent graduates from Loughborough University. As part of the longitudinal study 45 final year students were surveyed in October 2009. This group had been surveyed in 2006 when they were in their first year of their degree study in the Civil and Building Engineering Department at Loughborough University.

4.1.1 Profile of first year students

The following groups of students have been surveyed:

- MEng Civil Engineering students at Loughborough University (2006-07 and 2008-09),
- Commercial Management and Quantity Surveying (CMQS) at Loughborough University (2007-08 and 2008-09),
- Construction Engineering Management (CEM) at Loughborough University (2007-08 and 2008-09), and
- BEng/MEng Systems Engineering students at Loughborough University (2007-08).

In total, 266 questionnaires were sent out and 145 (55%) of them were completed. Of these, 87% of students were male, 11% female and two percent did not indicate their gender.

Seventy seven percent (111) of the students were in the sponsorship schemes, run by their departments. Of those who are not in the schemes (34), 31 did not apply for sponsorship and 3 applied but were rejected. However, 13 of them have alternative sponsorship, either through direct application to a company, by receiving a sponsorship offer after industrial placement, or by being sponsored by another organisation such as the army. Overall, 86% (124, 110 male and 14 female) of the group have sponsorship. Table 4-1 summarised the profile of the first year students.
Seventy eight percent of students were 19 years old or younger when they started their university degree. There is no major age difference between sponsored and non-sponsored students. Students were asked to give their ID or contact details for a possible follow up and 131 students (90%) provided these details.

### Table 4-1: The profile of first year students

<table>
<thead>
<tr>
<th>Population size</th>
<th>Response rate</th>
<th>Sponsored by a sponsoring consortium</th>
<th>Sponsored by consortia members or other organisations</th>
</tr>
</thead>
<tbody>
<tr>
<td>First year students</td>
<td>266</td>
<td>Total: 145 (55%)</td>
<td>Total: 111 (77%)</td>
</tr>
<tr>
<td>Male n % Female n %</td>
<td>Male n % Female n %</td>
<td>Male n % Female n %</td>
<td></td>
</tr>
<tr>
<td>126 87 16 11</td>
<td>100 90 11 10</td>
<td>110 89 14 11</td>
<td></td>
</tr>
</tbody>
</table>

#### 4.1.2 Profile of final year students

The following groups of students have been surveyed:

- Commercial Management and Quantity Surveying (CMQS) at Loughborough University (2006-07 and 2007-08),
- Construction Engineering Management (CEM) at Loughborough University (2006-07 and 2007-08),
- MEng Civil Engineering students at Loughborough University (2006-07, 2007-08, and 2008-09),
- MEng students in the school of Civil Engineering and the Environment at Southampton University (2006-07),
- Students sponsored through the Institution of Civil Engineers Quest Scheme (2006-07 and 2007-08),
- BEng/MEng Systems Engineering students in the Electronic and Electrical Engineering Department at Loughborough University (2007-08),
- MEng Innovative Manufacturing Technology students in the Mechanical and Manufacturing Engineering Department at Loughborough University (2006-07), and
- AutoCRC scholars in the Australian automotive industry (2007-08).
In total, 403 questionnaires were sent out and 238 (59%) of questionnaires were completed. Eighty four percent of students were male and 16% female.

Seventy percent (166) were in the sponsorship schemes, run by their departments. Of those who are not in the schemes (72), 56 did not apply for sponsorship and 16 applied but were rejected. However, 34 of them have alternative sponsorship, either through direct application to a company, by receiving a sponsorship offer after industrial placement, or by being sponsored by another organisation. Overall, 84% (200, 170 male and 30 female) of the group have sponsorship. Table 4-2 summarised the profile of the final year students.

<table>
<thead>
<tr>
<th></th>
<th>Final year students</th>
<th>Population size</th>
<th>Response rate</th>
<th>Sponsored by a sponsoring consortium</th>
<th>Sponsored by consortia members or other organisations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total: 238 (59%)</td>
<td>Total: 116 (70%)</td>
<td>Total: 200 (84%)</td>
</tr>
<tr>
<td>Male</td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>200</td>
<td>84</td>
<td>38</td>
<td>16</td>
<td></td>
<td>98</td>
</tr>
<tr>
<td>Female</td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>200</td>
<td>84</td>
<td>38</td>
<td>16</td>
<td></td>
<td>98</td>
</tr>
</tbody>
</table>

Seventy four percent of students were 19 years old or younger when they started their university degree. There is no major age difference between sponsored and non-sponsored students. Students were asked to give their ID or contact details for a possible follow up and 193 students (81%) provided these details.

### 4.2 Aim of the questionnaires

Two questionnaires were designed to collect data from the first and final year students. The first year student questionnaire contained questions about the students’ expectations of the sponsorship element of their programme and the final year student questionnaire contained questions about the students’ experiences of sponsorship. Table 4-3 details the main questions and copies of the full questionnaires can be found in Appendix 2.
Table 4-3: Summary of the student questionnaires

<table>
<thead>
<tr>
<th>Section 1: Demographics</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Gender</td>
</tr>
<tr>
<td>• Age</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Section 2: Your decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Please indicate how important each of the following were in your choice of university?</td>
</tr>
<tr>
<td>• Academic quality of university</td>
</tr>
<tr>
<td>• Degree programme reputation</td>
</tr>
<tr>
<td>• Facilities</td>
</tr>
<tr>
<td>• Financial aid available</td>
</tr>
<tr>
<td>• Social life</td>
</tr>
<tr>
<td>• Opinions of current students</td>
</tr>
<tr>
<td>• Sandwich training availability</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>How much did the availability of sponsorship influence your decision when choosing your programme?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did you apply for the sponsorship scheme run by your department?</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>Please indicate how important each of the following were in your decision to apply for sponsorship?</td>
</tr>
<tr>
<td>• Extra funding</td>
</tr>
<tr>
<td>• Industrial experience</td>
</tr>
<tr>
<td>• Practical skills</td>
</tr>
<tr>
<td>• Guaranteed job</td>
</tr>
<tr>
<td>• Extra training opportunities</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>If you did not apply for the sponsorship scheme run by your department, please indicate the effect of each of the following in your decision:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Complicated application procedure</td>
</tr>
<tr>
<td>• University rules and conditions</td>
</tr>
<tr>
<td>• Sponsor company rules and conditions</td>
</tr>
<tr>
<td>• Lack of information about the scheme</td>
</tr>
<tr>
<td>• Lack of interest</td>
</tr>
<tr>
<td>• time commitment</td>
</tr>
<tr>
<td>• Lack of confidence</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>What changes to the scheme would encourage you to apply for sponsorship?</th>
</tr>
</thead>
<tbody>
<tr>
<td>If you have already sponsored, how did you get the sponsorship?</td>
</tr>
<tr>
<td>• Applied directly to the sponsor company</td>
</tr>
<tr>
<td>• Received sponsorship offer after work experience before starting university</td>
</tr>
<tr>
<td>• ICE QUEST scholarship</td>
</tr>
<tr>
<td>• Other (please specify):</td>
</tr>
</tbody>
</table>
Table 4.3: Summary of the student questionnaires - continued

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>How did you first hear about the scheme?</td>
<td></td>
</tr>
<tr>
<td><strong>Section 3: Application procedure</strong></td>
<td></td>
</tr>
<tr>
<td>Please indicate your agreement with the following elements about application for sponsorship:</td>
<td></td>
</tr>
<tr>
<td>• The information provided was clear</td>
<td></td>
</tr>
<tr>
<td>• The information provided was useful</td>
<td></td>
</tr>
<tr>
<td>• The application form was easy to follow</td>
<td></td>
</tr>
<tr>
<td>• The interview was well organised</td>
<td></td>
</tr>
<tr>
<td>• The administrative process was efficient</td>
<td></td>
</tr>
<tr>
<td>How could the application process be improved?</td>
<td></td>
</tr>
<tr>
<td>Do you think your CV and application form was satisfactory?</td>
<td></td>
</tr>
<tr>
<td>Do you think your interview technique was satisfactory?</td>
<td></td>
</tr>
<tr>
<td>Do you think you are lacking skills required by the companies?</td>
<td></td>
</tr>
<tr>
<td>What extra support could be giving in order to help you to obtain sponsorship?</td>
<td></td>
</tr>
<tr>
<td><strong>Section 4: The sponsorship scheme</strong></td>
<td></td>
</tr>
<tr>
<td>Please indicate your agreement with the following aspects about your contact in the company</td>
<td></td>
</tr>
<tr>
<td>• Is easy to approach and talk with</td>
<td></td>
</tr>
<tr>
<td>• Motivates me to perform at my highest level</td>
<td></td>
</tr>
<tr>
<td>• Treats me with dignity and respect</td>
<td></td>
</tr>
<tr>
<td>• Supports exceptional academic performance</td>
<td></td>
</tr>
<tr>
<td>• Answers my questions clearly</td>
<td></td>
</tr>
<tr>
<td>• Offers practical help and support</td>
<td></td>
</tr>
<tr>
<td>What have you gained (expect to gain) most from the sponsorship scheme?</td>
<td></td>
</tr>
<tr>
<td>What benefits do you think your sponsor company has gained from the sponsorship scheme?</td>
<td></td>
</tr>
<tr>
<td>What aspect(s) of the sponsorship scheme has influenced or impressed you the least?</td>
<td></td>
</tr>
<tr>
<td>How could the sponsorship scheme be improved?</td>
<td></td>
</tr>
<tr>
<td>How well did the sponsorship scheme support the learning outcomes of your degree programme?</td>
<td></td>
</tr>
<tr>
<td>In general, how do you feel you (could) have benefited from the sponsorship element of your programme?</td>
<td></td>
</tr>
</tbody>
</table>
### Table 4.3: Summary of the student questionnaires - continued

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>What was your understanding of the sponsorship scheme before you came to university?</td>
<td></td>
</tr>
<tr>
<td>If you knew what you know now, would you apply for the sponsorship scheme today?</td>
<td></td>
</tr>
<tr>
<td>Would you recommend the sponsorship scheme to other students?</td>
<td></td>
</tr>
</tbody>
</table>

**Section 5: Job offer** (For the final year students only)

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have you received a permanent job offer from your sponsor (or any other) company?</td>
<td></td>
</tr>
<tr>
<td>If you receive an offer, will you accept it?</td>
<td></td>
</tr>
</tbody>
</table>

Please indicate how important each of the following are in your decision to accept a job offer:

- Duties of the job
- Training and development programmes
- Progress opportunities
- Salary
- Other benefits
- Working conditions
- Type of project/work carried out
- Location

Please indicate how important each of the following are in your decision to reject a job offer:

- Better job opportunity
- Job expectations
- Not challenging
- Pay and benefits
- Location
- Further study
- Working conditions
- Moving out of Civil Engineering

Section 1 gathers general information to enable the researcher to carry out a follow up study as a part of a longitudinal research of sponsored students’ views and expectations during the last year of their study and after graduation. Also, this information helps to analyse the proportion of male and female students and identify the age groups.
Section 2 requests information about student decisions on choice of university and applying for sponsorship, and also the factors which they considered when making these decisions. The main aim of this section was comparing sponsorship availability with the other factors.

Section 3 focuses on the sponsorship application procedure to find out how students think about it and how it could be improved. If the procedure is not clear and efficient, it would be a barrier for applying for sponsorship.

Section 4 aims to find out about what students think about their contacts with the company, the strength and weakness of the sponsorship schemes, how they can be improved, students’ views on sponsorship before coming to the university and impact of sponsorship on their learning and programme outcomes which are linked to student employability. The main aim of this section is to find out if students’ experiences of sponsorship match their expectations, and whether they would recommend the scheme to other students.

Section 5 requests information about students’ employability and their expectations and preferences regarding future careers. Questions were asked to find out if they have received a permanent job offer and the factors which make them decide to accept or reject a job offer.

4.3 Sponsorship influence on students’ choice

This section aims to indicate what role sponsorship plays in a student’s choice of university and programme.

4.3.1 Role of sponsorship in the choice of university

In order to compare the influence of different factors on a student’s choice of university, students were asked to rate on a scale of 1 to 6 (1 = low importance, 6 = high importance) the importance of the following factors: academic quality of university, degree programme reputation, facilities, sandwich training availability, social life, opinion of current students, financial aid availability, and location. The aim of this question was to
compare the impact of availability of financial aid and sandwich training, which are two basic elements of the sponsorship schemes, with the other factors on a student’s choice of university. Figure 4-1 and Figure 4-2 present the results from the first and final year students.

*Academic quality of university, degree programme reputation, and facilities* are seemed to be most important factors, and financial *aid availability* has the least effect on student choice. Whilst 90% of first year students and 83% of final year students ranked *academic quality of university* as important (which shows the importance of university reputation), only 24% of first year students and 15% of final year students ranked *financial aid availability* as important (these percentages are the sum of the important and very important categories).

UK students now pay tuition fees in excess of £3000 and take loans for their support during studies, and it was therefore, thought that the availability of funding would be rated highly, but this was not the case. Surprisingly the results show that the availability of financial aid was ranked very low. Further analysis was carried out on the students’ background to determine whether this varied between the different universities in the study. The Kruskal Wallis test was performed to compare the results from Loughborough University students with Southampton University students and the ICE scholars. The result shows that *p* value for this test is 0.36 (>0.05 – section 3.7) therefore, there is no statistically significant difference between the students’ views on the financial aid availability from the different universities that participated in this study. Though, it may be due to these universities having similar profiles and it may not be true across the UK higher education sector. Further research needs to be done to include more universities with different profiles and with students from dissimilar backgrounds.
Figure 4-1: The importance of different factors in choice of university - first year students' results (n=145)

Figure 4-2: The importance of different factors in choice of university - final year students' results (n=190)
However, the results show the awareness of the importance of financial aid and sandwich placement availability is increasing (Figure 4-3). There is a statistically significant difference (Mann-Whitney test, p=0.02<0.05) between the first year students’ view about the importance of these factors and the view of the final year students who applied to the programmes 4 years previously in either 2002 or 2003. The fourth year students stated that they thought these factors were less important at the time they applied. But, now their views have changed, and they value these factors highly as they have more experiences. They said that they would recommend other students to apply for sponsorship.

![Figure 4-3](image-url)

**Figure 4-3: The variation of the importance of financial aid and placement availability (Mean)**

The impact of some other factors depends on the individuals and different universities. The department of Civil and Building Engineering at Loughborough University, for example offers the opportunity to all of its students to take a sandwich year in industry after two years of academic study. This traditional ‘thick sandwich’ is offered on virtually all programmes at Loughborough University which makes the university one of the largest providers of sandwich placements in the UK. Results show sandwich training availability had an important influence on the students’ choice to study at Loughborough. This was expected as only a minority of universities in the UK offer sandwich placements.
on a large scale and hence Loughborough would attract a high proportion of students who rate sandwich placements as a high priority. Groups of similar students at Southampton University and ICE scholars were asked to answer the same question, in order to find out about their views on the importance of the placement availability. None of the students from other universities ranked availability of sandwich training as important (Figure 4-4) while 58% of Loughborough University students considered it important as they regard gaining experience and improving practical skills more important as seen in Table 4-4.

![Figure 4-4: The impact of availability of sandwich training on students' choice of university](image)

**Table 4-4: The importance of gaining experience and training by respondent groups (Mean)**

<table>
<thead>
<tr>
<th></th>
<th>Gaining experience</th>
<th>Improving practical skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loughborough University students</td>
<td>5.4</td>
<td>5.2</td>
</tr>
<tr>
<td>Other Universities’ students</td>
<td>4.7</td>
<td>4.3</td>
</tr>
</tbody>
</table>
4.3.2 The influence of sponsorship on students’ choice of programme

Students were then asked to rank the importance of availability of sponsorship on their decision when choosing their programmes. The results show that there is a statistically significant difference between the first and final year students’ perceptions (Mann-Whitney test, p=.001<0.05 – section 3.7). Only 32% of final year students who applied to the programmes in either 2002 or 2003 were influenced by the availability of sponsorship at the time when they applied for the programme. However, as Figure 4-5 shows, awareness of the importance of sponsorship has increased and 58% of first year students who applied to the programmes 4 years later stated that sponsorship had an important influence on their decision.

![Figure 4-5: The importance of sponsorship availability increases by time](image)

Increased tuition fees and changes in financial situations could be reasons for the increasing impact of sponsorship on the students’ choices. There is still a need to increase students’ awareness of the benefits that accrue from sandwich training and financial aid availability.

Also, in order to test the differing views of the importance of sponsorship availability for students in fully sponsored programmes (such as CMQS and CEM) and partly sponsored programmes (such as MEng in Civil Engineering), they were asked to rate on a scale of 1
to 6 (1 = low importance, 6 = high importance), how important this factor was. The
results revealed a statistically significant difference between their views (Table 4-5).

Table 4-5: Group differences in their views on the influence of sponsorship on programme choice

<table>
<thead>
<tr>
<th>Test Statistics(a,b)</th>
<th>Influence of sponsorship on programme choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-Square</td>
<td>23.08</td>
</tr>
<tr>
<td>df</td>
<td>2</td>
</tr>
<tr>
<td>p value</td>
<td>0.00***</td>
</tr>
</tbody>
</table>

a  Kruskal Wallis Test
b  Grouping Variable: Programme (MEng in Civil Engineering, CMQS, and CEM)

***. The difference is significant at the 0.001 level

Sponsorship is compulsory for the CEM and CMQS programmes and the returned mean
is 4.59 and 4.32 relatively (Table 4-6), indicating that students enrolled in these courses
stated this factor had an important influence on their choice of programme. MEng in
Civil Engineering is a partly sponsored degree programme and the returned mean is 2.88,
which shows students were not influenced significantly by the availability of sponsorship.

Table 4-6: Influence of sponsorship on programme choice

<table>
<thead>
<tr>
<th>Programme</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEng in Civil Engineering</td>
<td>2.88</td>
<td>1.5</td>
</tr>
<tr>
<td>CEM</td>
<td>4.59</td>
<td>1.2</td>
</tr>
<tr>
<td>CMQS</td>
<td>4.32</td>
<td>1.1</td>
</tr>
</tbody>
</table>

4.4 Students’ expectations of sponsorship

During the literature review some factors have been identified as benefits to students
from university-industry links. The research sought to identify the respondents’
extectations of the role of sponsorship in gaining these benefits. They were asked to rate
on a scale of 1-6 (1 = Not important, 6 = Very important) the importance of the following
factors on their decision to apply for sponsorship once they had chosen their programme:
extra funding, industrial experience, practical skills, a guaranteed job, improved job
chances elsewhere, and extra training. Figure 4-6 and Figure 4-7 show the relative importance of the above factors.

Figure 4-6: The importance of different factors in applying for sponsorship - first year students' results (n=145)

Figure 4-7: The importance of different factors in applying for sponsorship - final year students' results (n=190)
It is interesting to note that *industrial experience* was identified by over 85% of the students (sum of important and very important categories) as the most important reason to apply for sponsorship, followed by *extra training, future career* and lastly *extra funding*. This shows that students are highly aware of the importance of the real world experience, which is a major factor in recruitment of new graduates. They expect their link with a company for four years will give them the opportunity to gain this experience.

The following statement from the government white paper ‘The Future of Higher Education’ (Department for Education and Skills, 2003) reinforces this view:

“establishing close relationships between employers, in particular industrial sectors and the relevant faculties in institutions is critical to preparing new entrants to the workforce and to continuous professional development.”

This result has been supported by responses to the following open ended question “*What do you expect to gain most from the sponsorship scheme?*” in which “*industrial experience*” was identified as the most important benefit of sponsorship by a majority of students. This result is in line with the survey’s result from the final year sponsored students who are at the final stage of their degree: this confirms that gaining industrial experience is the main achievement of sponsorship for them (Figure 4-8). They agreed that sponsorship is a chance to apply theoretical knowledge to real industrial problems, which is valuable hands on experience and a vital credit in new recruits confirms students’ preferences.

![Figure 4-8: How the reality of sponsorship meets student expectations](image-url)
“Professional contact with industry”, “extra funding”, “job opportunity”, “better understanding of the role of a civil engineering”, “a link to professional bodies”, “placements” and “professional skills” have been identified as other benefits of sponsorship by students. One student said:

“my company has taught me a great deal - which means I’ll be one step ahead on graduation.”

Another respondent said:

“A job where my contribution to the company has already had the effect and I am treated with respect”, adding: “having the financing and summer placement has been invaluable in my ability to maintain a reasonable standard of living.”

Students also mentioned how they have been encouraged to get involved with other activities in the company such as going to meetings and presentations and making close links with people in the industry.

There is no significant difference between first and final year results. Although there is considerable homogeneity overall in the views of the students from the different programmes taking part, the research includes a closer examination of two particular groups of students in order to understand better their particular views and expectations. The first group is students in a partly sponsored programme (MEng in Civil engineering) and the second group is students in fully sponsored programmes (CEM and CMQS).

As Figure 4-9 shows, the students on the sponsored degree rated industrial experience, practical skills, a guaranteed job, and extra training as more important in comparison to the students on the MEng in Civil Engineering.
4.5 The reasons for not applying for sponsorship

Students who did not apply for sponsorship were asked to rate on a scale of 1-6 (1 = Not at all, 6 = Considerably) the impact of the following factors on their decision not to apply for the sponsorship scheme run by their department: already sponsored, lack of information about the scheme, lack of interest, university rules and conditions, time commitment, sponsor company rules and conditions, complicated application procedure, and lack of confidence.

Figure 4-10 presents the result of the first year students and Figure 4-11 demonstrates the results of the final year students who applied to the programmes 4 years previously.

As the figures show being already sponsored and lack of information about the scheme have influenced the students in some way not to apply for the sponsorship scheme run by their department.

The results suggest the application process should be run as early as possible in the academic year to make sure that students are not getting other offers and also sponsoring companies have vacant positions to offer to the students. In addition, providing students
with detailed information about the sponsorship schemes including requirements and expectations could increase the number of applications for the schemes.

![Graph showing reasons not to apply for sponsorship](image)

**Figure 4-10:** Reasons not to apply for sponsorship - Mean for the first year students’ results (n=34)

![Graph showing reasons not to apply for sponsorship](image)

**Figure 4-11:** Reasons not to apply for sponsorship - Mean for the final year students’ results (n=56)
4.6 Application procedure

Students who applied for sponsorship were asked their views on the application procedure for sponsorship and how clear and efficient it was. They were asked to rate on a scale of 1 to 6 (1 = Strongly disagree, 6 = strongly agree) their agreements with the following elements about the process: the information provided was clear, the information provided was useful, the company fair was useful, the application form was easy to follow, the interview was well organised, and the administrative process was efficient. The overall impression gained was that there were no major problems with the application procedure and over 70% of the students agreed / strongly agreed with the above factors.

The participants were then asked to mark areas for improvement by answering this open-ended question “How could the application process be improved?” One of the main issues mentioned was the timing of the application. The students said that it runs too late in the academic year, and by the time they apply many companies are full. Therefore, an earlier application schedule would have a positive effect on the procedure. Other suggestions were: “more communication and update information after applying and before the interviews” and “providing better and more accurate information about the sponsoring companies such as contact details”.

4.7 Industry contacts

In order to find out how students are supported by their contacts, supervisors, or line managers in the company, they were asked to rank their agreement with the following aspects about their contacts in industry: is easy to approach and talk with, motivates students to perform at their highest level, treats them with dignity and respect, supports exceptional academic performance, answers students’ questions clearly, and offers practical help and support. The results from the first year students showed over 80% of students agree that these entire factors are important to them. However, the final year students’ experiences showed that while 72% agree that they have been treated with dignity and respect, only 42% stated that industry supports exceptional academic performance.
The results appear to show that employers do not seek exceptionally high academic performance and this reinforces the findings of other surveys of employers that rate employability skills above academic performance (Dickens, 1996).

### 4.8 Sponsorship benefits

In general, the first year students expect to benefit in some way from the sponsorship element of their programme and 94% of the final year students agreed that they have benefited from sponsorship. One respondent said:

> “If nothing else, sponsorship gives you relevant experience, contacts and exposure to industry, which are useful throughout your study.”

Over 90% of the students expressed that if they knew what they know now they would apply for the sponsorship scheme today and 97% of students would recommend the sponsorship scheme to other students. This could have an important influence on future students’ choice. Students were asked to list the reasons for their recommendation with most students stating gaining “work experience”, “extra funding”, “future career”, “link with industry”, “training”, “better understanding of the role of an engineer”, and “incentive for working harder” as the important factors.

One CEM student stated:

> “it is a good scheme, very well run with good content. I feel it means you are doing your degree for a reason not just for the degree’s sake”, adding “Knowing that we are essentially being paid and trusted by our sponsor to be here makes me feel more passionate about my work here. Lucrative scheme to be involved, it is fun and enjoyable.”

The sponsorship schemes enable students to have a clear vision on what they want to do, help them to secure a work placement with the company and make a commitment to the company.
“It provides ways of showing that Civil Engineering is a very highly respected and good industry to go into”, one student said.

The students stated they establish an open link with industry and opportunity to gain valuable experience during the industrial placements and possibly security of employment upon graduation. One student said:

“It is excellently organised and helps you to gain valuable experience within the industry. Establishing a link with a company at an early age focuses you and enables you to plan more for the future - the foot in the door is a great help. It builds your confidence about your abilities in the sector. It gives you a head start and you feel in a better position to achieve than everyone else.”

Financial aid helps students through the university years and this could be important in many cases as it will allow them to afford related activities / equipment to enhance their degree programme. It also allows them to enjoy their university life without financial worries.

“Being tied to a sponsoring company” is the main reason for not recommending the scheme to the other students. From these students’ point of view, sponsorship ties students down. They believe engineers are in such a high demand, especially engineering graduates from reputable universities, that some may prefer to keep their options open since it is likely they may receive a number of offers when applying for graduate positions. Finally, it depends on the individuals, as one student said: “It is a good scheme but just not for me.”

4.9 Benefits to sponsor companies

Students were asked to identify the main advantages of sponsorship for the sponsoring companies by answering this open ended question: “What benefits do you think your sponsor company has gained from the sponsorship scheme?”

They stated that sponsorship enhances the company’s ability to recruit high quality graduates. In addition, “access to well trained labourforce”, “increased company
reputation”, and “investment in the company” have been mentioned as the other benefits to the sponsoring companies from the sponsorship scheme.

The students see sponsorship as a cost effective recruitment method for the employers. Sponsorship is an obvious long term investment in the profession which enables the employers to get the best of the students working for them with a view to employing them afterwards. They also get an individual who understands their company’s processes, ethos and way of thinking.

One respondent expressed:

“I appreciate that they are taking a gamble on the person, and they will not recruit everybody they invest in, but they know that the people they do recruit are of a very high quality. It serves to enhance their reputation amongst students, as we tell each other about our sponsoring companies and their qualities.”

They also stated that the company is able to get students to do productive work at a cheaper rate: the students are therefore, good value for money for the company. One student said:

“summer placement allows the company to conduct an in depth investigation into a problem by a student- that otherwise would never have been investigated in such a way.”

The students also perceived that they were a source of ‘cheap’ labour to the company. It is thought the students do not take into account the overall costs to the company of their sponsorship and placement training.

4.10 Dissatisfaction with sponsorship

To find out about students’ opinion on the disadvantages of sponsorship, they asked to answer the following question: “What aspect(s) of the sponsorship scheme has influenced or impressed you the least?” The majority of the respondents stated that there is not any aspect of dissatisfaction. However, analysis of the individuals’ responses to this question
revealed the following issues: “poor communication”, “poor mentoring”, “lack of contact while at university” and administration issues such as “poor support and communications”. These issues were followed by “the money”, “being tied in for a period post graduation”, “difficulty of arranging placements”, and “the lack of clear information about their roles and responsibilities within the company.”

It should be noted that the students are visited by academic staff and they are also supported by industrial supervisors. However, a small number of students mentioned the lack of academic mentor and supervision on the site from the company to discuss their progress and give general support and guidance. According to one student’s comment:

“it was a very good idea but with the mentor working full time and the students at university all day and with coursework deadlines and exams, it never enters your head to meet up with the mentor even though you would definitely benefit from doing so. There should be student mentor meeting events whereby both mentor and student have a reason to specifically put it in their diary and attend.”

In some cases, the respondents said that there are difficulties of arranging placements, and it varies from company to company. Actually, the students should take into account that sometimes their partner companies do not know vacant positions until very late. Therefore, they are not able to provide placement information about location, salary and accommodation. Thus, it is important for the students to be flexible and do not limit themselves.

Another disadvantage mentioned by few numbers of the respondents was the low level of pay, whilst they are on summer work placements. One student said:

“Whilst experience was valuable, if I had not been on placement with the sponsor company, I could have earned more money working for a different engineering firm.”

Though, the students should think about the long term benefits which derived from sponsorship.
Finally, students highlighted the role of the HR department and administration team as in a number of schemes, they are the only point of contact a student initially has with a company until they get on the site. Therefore, it is important that the HR departments keep a good communication between the students and the employers.

4.11 Scheme improvements

A survey question asked respondents to identify the areas of sponsorship which need improvement. The students stated that “more and better contact, feedback, and mentoring from industry supervisors”, “more participation from sponsors during term”, “clear information before applying”, “going to more than one place for placement”, and “larger choice of companies” would improve the sponsorship scheme.

Overall, students stated they have a good relation with their industrial contacts. However, the results reveal that there is still room for improving the level of communication between them, especially when the students are at university during academic semesters. The students need to receive good feedbacks from their line manager/project manager on their performance which would facilitate their learning.

One student said: “during the final year I hardly had any contact with the sponsor company’s coordinator or any words of encouragement to do well. It is almost like it doesn’t matter what class of degree you get. I also had to get in touch with the company myself to discuss a job upon graduation.”

Another factor which makes a sponsorship scheme successful is providing easily accessible, clear and encouraging information about sponsorship. The benefits should be provided to students before coming to university and even to their families and schools.

Whilst the students would like a larger number of sponsoring companies, there is a mixed reaction from the employers. Some of the companies are reluctant to increase the size of the consortia as it impacts on their chances of recruiting the best students. On the other hand, a number of them believe that they are in the competitive world, and it is up to companies to identify and encourage people who are right for the individual company.
They stated that the schemes should be open to a wider range of companies to give the students a larger choice.

In fact, while partnered scholarships are a good idea, but can end up "locking" students to a company that they may not be happy with. The awards should be partnered with a variety of firms in industry and students should be offered the opportunity to carry out placements at 2 or more in the partner companies over the course of the 4 year degree. It will allow them to make an informed decision about where to work at the end of their degree rather than feeling "tied" to one company.

One MEng Civil Engineering student said:

“They stated that the schemes should be open to a wider range of companies to give the students a larger choice.

In fact, while partnered scholarships are a good idea, but can end up "locking" students to a company that they may not be happy with. The awards should be partnered with a variety of firms in industry and students should be offered the opportunity to carry out placements at 2 or more in the partner companies over the course of the 4 year degree. It will allow them to make an informed decision about where to work at the end of their degree rather than feeling "tied" to one company.

One MEng Civil Engineering student said:

“Although the industry companies bring in more funds for sponsorship, it is a major drawback for some students who get partnered with a contractor when they may have wanted a consultant. Some feel trapped with that company and may be deterred from Civil Engineering as a career. It is very important to be more direct about the difference between contracting and consultancy at the start and give everyone the opportunity to try both contractor and consultant work placements and see which is most suited to them.”

However, sending students to different placements would be very difficult to achieve. Furthermore, it should be noted that the students have the choice when applying, and they did not have to take any offers made. Therefore, students need to gain information about the partner companies and the areas of their expertise, and companies’ expectations of them. It will help them to be better equipped and know which path they wish to take when they start out.

Other suggestions made by students are:

- appointing a single contact point in the sponsor company who deals with the sponsorship issues, thus all the matters could be chased up easier and
- making the schemes more interactive, so they feel that they are part of the company and that the company recognizes them as such.
4.12 Sponsorship support of selected programme learning outcomes

It is important that the aims of the work-related learning period are set out to support students to achieve learning outcomes of their programmes.

In this research, a number of general learning outcomes of undergraduate engineering programmes, linked to student employability, were selected and in the questionnaire, students were asked on a scale of 1-6 (1 = Not at all, 6 = Considerably) how sponsorship supported these learning outcomes in their programme.

Figure 4-12 compares the first year students’ perception of how the sponsorship element of their programme should contribute to their attainment of learning outcomes with the final year students’ perception of how it actually supported these learning outcomes. The mean of responses from the first year students was over 5.1 indicating that overall respondents have a high awareness that their links to a sponsor should have a major impact on the development of the learning outcomes linked to employability skills. The majority of them expected that sponsorship would support the attainment of these learning outcomes quite a lot (mean score of 5.3). The final year students agreed that it has supported the achievement of these learning outcomes in some way, but not to the same extent (mean score of 4.7).

![Figure 4-12: Students' perception of sponsorship support of selected learning outcomes (Mean)](image-url)
The responses appear similar in first and final year students’ answers, i.e. all factors have received high and close equal rating; however, final year students used a slightly lower ranking than first year students. This might be linked to difference between expectation and reality as first year students have less experience of sponsorship and hence have idealistic expectations, but final year students have more experience and hence have more realistic views.

The results also suggest that there is a need for more focus on the role of professional engineer in society, use field equipment competently and safety, and observing, recording, and analysing data.

There was no significant difference between the demographic groups identified within the survey, which suggests a reasonably consistent view on the question.

### 4.13 Understanding of sponsorship

The results show that the level of understanding of sponsorship for both first and final year students are low. Figure 4-13 indicate that 25% of first and 47% of final year students did not have a clear understanding of the sponsorship schemes before coming to university. As Figure 4-14 shows the situation is even worse for students who did not apply for sponsorship (61% and 67%, respectively). Therefore, more investment in publicity might generate more application for the schemes.

![Figure 4-13: Students’ understanding of sponsorship before coming to university](image-url)
In order to investigate if the students were not aware of the sponsorship schemes, or they were aware but did not have enough information about it before coming to the university, the survey included the following question: “*Were you aware of the sponsorship scheme run by your department before coming to university?*” The results vary from programme to programme. While more than 70% of the MEng students in the civil and building engineering department said that they were aware of the schemes, only 10% of the Systems Engineering students were aware of the scheme. However, it should be noted that the sample size was small.

These responses suggest that the publicity material for the schemes should be reviewed to provide clearer and accurate details about it, although it already has a high profile in the departmental marketing materials.

### 4.14 Sponsorship advertising

In order to find out about the effective advertising methods for sponsorship, the students were asked how they first heard about the sponsorship scheme. Responses for the final and first year students are shown in Figure 4-15 and Figure 4-16 respectively.
Comparing these figures reveals a sharp increase in the university website in the last 4 years, from 6% to 24%. Although the website could play an important role in introducing the sponsorship scheme, it has to be noted that the role of university and company websites are very low for both sets. Therefore, there is a need to boost the effectiveness of the websites in introducing sponsorship, especially knowing that the number of prospectus/department brochures—which appear to be the most common advertising tools—will be cut down significantly in the future.

<table>
<thead>
<tr>
<th>Method</th>
<th>First Year</th>
<th>Final Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>University website</td>
<td>24%</td>
<td>6%</td>
</tr>
<tr>
<td>Company website</td>
<td>0%</td>
<td>3%</td>
</tr>
<tr>
<td>Prospectus/department brochure</td>
<td>28%</td>
<td>41%</td>
</tr>
<tr>
<td>Department visit/University open day</td>
<td>2%</td>
<td>1%</td>
</tr>
<tr>
<td>Advertisement/Publication</td>
<td>4%</td>
<td>20%</td>
</tr>
<tr>
<td>Other*</td>
<td>42%</td>
<td>29%</td>
</tr>
</tbody>
</table>

* Students mentioned friend and word of mouth as other sources.

**Figure 4-15: Sponsorship publicity - final year students’ results**

**Figure 4-16: Sponsorship publicity - first year students’ results**
4.15 Contribution of sponsorship to employability

The survey results show that 75% of final year sponsored students had received a permanent job offer, compared with 41% of non-sponsored students (including placement students), at the time of the survey.

Also, the results show that being sponsored by a company means that the sponsored students are more likely to take employment in engineering (see Figure 4-17): 65% of the sponsored students will accept a job offer they have received and stay with their sponsoring companies, while 25% have not decided yet and 10% will not accept the offer. The results for non-sponsored students are 43% will accept the offer, 46% have not decided yet and 11% will not accept the offer.

Of those sponsored students who will not accept the offer or have not decided to accept the offer only 9% stated that they will move out of engineering while the result for the non-sponsored students is 20%.

The participants were then asked to give an overall assessment on a scale of 1 to 6 (1 = not important, 6 = very important), of the importance of different factors for accepting or declining a job offer. The results are summarised in Table 4-7 and Table 4-8, where they are presented in descending order of mean value.

![Figure 4-17: Students’ decision regarding the job offer](image-url)
Table 4-7: The main factors to accept a job offer
(1= Not important 6=Very important)

<table>
<thead>
<tr>
<th>Factor</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Progress opportunities</td>
<td>5.5</td>
</tr>
<tr>
<td>Training and development programme</td>
<td>5.3</td>
</tr>
<tr>
<td>Salary</td>
<td>5.2</td>
</tr>
<tr>
<td>Type of project/work carried out</td>
<td>5.0</td>
</tr>
<tr>
<td>Duties of the job</td>
<td>4.9</td>
</tr>
<tr>
<td>Working conditions</td>
<td>4.8</td>
</tr>
<tr>
<td>Location</td>
<td>4.2</td>
</tr>
<tr>
<td>Other benefits</td>
<td>4.2</td>
</tr>
</tbody>
</table>

Table 4-8: The main factors to decline a job offer
(1= Not important 6=Very important)

<table>
<thead>
<tr>
<th>Factor</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Better job opportunity</td>
<td>5.4</td>
</tr>
<tr>
<td>Not challenging</td>
<td>4.9</td>
</tr>
<tr>
<td>Job expectations</td>
<td>4.9</td>
</tr>
<tr>
<td>Working conditions</td>
<td>4.6</td>
</tr>
<tr>
<td>Pay and benefits</td>
<td>4.5</td>
</tr>
<tr>
<td>Further study</td>
<td>4.0</td>
</tr>
<tr>
<td>Location</td>
<td>4.0</td>
</tr>
<tr>
<td>Moving out of Engineering</td>
<td>2.4</td>
</tr>
</tbody>
</table>

As Table 4-7 shows progress opportunities, training and development programmes, salary, and type of project/work carried out are the most important factors for students to accept a permanent job offer. Table 4-8 shows that they would not accept a job offer if there is a better job opportunity available or if the job is not challenging.

4.16 The Graduate perception

In order to find out the views of graduates on sponsorship and its impact on them, as an individual and their career, an online questionnaire was carried out with recent Civil and Building Engineering graduates from Loughborough University. During the
sponsors/advisory committee meeting held in April 2009, the consortium members were asked to invite their employees who have been in the scheme and recently graduated to take part in this survey. Twenty completed questionnaires from five companies were received and this section presents the findings of the survey covering the following areas:

- the time they have spent with the sponsoring company during their studies and after graduation,
- what they think about being in a degree with/without sandwich placement or sponsorship,
- what they have gained from the sponsorship and, if they would encourage other students to take up sponsorship,
- disadvantages with the sponsorship (if there were any), and
- the barriers which prevent more students applying for sponsorship.

The respondents stated they have spent between one and half years to four and half years with their sponsoring company during their studies. Eighty five percent of them have spent more than 2 years (Figure 4-18a). They have been with their sponsors between 6 months to five years after graduation, 35% worked for the company for more than 2 years, 25% for one to two years and 40% between 6 months to 1 year at the date of the survey (Figure 4-18b).

![Figure 4-18: Time spent in the sponsoring companies]

a) during study  
   b) after graduation
4.16.1 Preference for choice of degree

A survey question was used to ascertain what kind of degree programme structure was preferred by the respondent graduates. They were asked how they feel they could have benefited the most from being in a:

- degree without sandwich placement or sponsorship,
- degree with sandwich placement only,
- sponsored degree without sandwich placement, or
- sponsored degree with sandwich placement.

The research findings indicate 95% of respondents stated the sponsored degree with sandwich placement will offer the most benefits to the students. This is because sponsorship obviously offers financial and industry support throughout the course and the sponsors are more willing to provide assistance during the students’ studies. The financial support during their degree certainly helps relieve the financial stress and there is no need to job hunt during the busy final year and dissertation period.

“This gives both experience and greater financial backing: experience and cash – can’t go wrong”, said one graduate.

Sandwich placements provide great experience which helps consolidate the first few years of university and provide experience to be built on during the final years. Sponsorship guarantees work during the summer months and the year out: this breaks up the study time and helps develop personal skills and provide the opportunity to experience industry before graduation. One graduate noted:

“It gives an incentive to do well for your sponsoring company. You have a better chance of employment at the end. You can gain experience, yet still complete a full degree. Financial help is beneficial.”

Only one respondent would have preferred a degree with sandwich placement only as he felt that work experience during a sandwich year is crucial before deciding whether to commit to a company by accepting sponsorship.
4.16.2 Benefits of sponsorship

All graduates said they had benefited from the sponsorship scheme. The benefits are in forms of gaining work experience, industry relations, and employment after graduation and financial support.

They explained that sponsorship gives a better idea how things are done in the "real world", how theory is put into practice, and an almost guaranteed job at the end of the degree. Summer and year out work enabled communication and professional skills to be improved greatly and experience to be gained in areas that are not covered in great depth at university. Work experience during university helps understand the course better and the company could provide materials, resources and technical advice.

In addition, financial help is provided through their course and a good salary is earned during placements. This greatly helps with the cost of a student’s education.

They also said that a total of several months of site engineering experience prior to full time employment give the students an advantage over other graduates and a guaranteed job upon completion of the degree. Therefore, they have peace of mind that they will have a job when they have finished their university degree. In the words of one respondent:

“It [sponsorship] allowed me to gain contacts during the course who I could use for assistance with university work. It provided experience to draw on and use in coursework and gave a practical view of what to expect after graduation. It allowed me to start work after graduation; knowing what to expect, knowing people that I would be working with and the role I would be undertaking.”

In addition, the process of gaining sponsorship gives the students good experience at a young age, for example in CV writing and the interview process.

Considering all the benefits, all the graduates said they would encourage other students to take up sponsorship. “I found my experience useful and would recommend without hesitating”, one noted.
4.16.3 Disadvantages with sponsorship

The respondents were asked to respond to an open-ended question within the survey to say what disadvantages, if any, there were with sponsorship. The common responses were: “being faced with having to stay with the sponsor after graduation”, “being tied to one company and difficult to gain experience in other sectors” and “lack of information about any binding terms and conditions prior to accepting the sponsorship.”

Sponsoring companies expect students to work for them during placements, and it is therefore, hard for the students to gain experience elsewhere. In some other cases, however, the graduates never felt that they needed to apply elsewhere in their final year to see what other opportunities were available.

Overall, the results show the majority of the graduates felt there were not any disadvantages at all. One noted:

“there was no disadvantage. Some think that having to work for one year for the company is a disadvantage, but they [the companies] offer competitive salaries, enjoyable work and further development, and I can’t see myself leaving in the near future.”

4.16.4 Barriers to applying for sponsorship

The survey respondents were then asked: “do they think there are any barriers which prevent more students applying for sponsorship?”

One in three participants believed there is nothing stopping students applying and they do have to be proactive to find a sponsoring company. The other mentioned:

• students do not realise the benefits of funding support, experience, and possible job on graduation,
• worries among students concerning early commitment to one company and how long this ties them in for when they are still deciding what to do/achieve in their career, and
• students are not aware that sponsorship exists before choosing a University course.
One respondent said:

“There is limited information provided. It was only by chance that I became aware of sponsored courses after searching for courses on the internet. It is an excellent way to go through university, with good career prospects at the end. Sponsored programmes should be wider publicised.”

It highlights the importance of advertising of sponsorship and sponsors, tutors, and careers advisors can help with this and give advice to the prospective students and outline the benefits of the schemes.

4.17 Further study and follow up survey

In October 2009, a survey was carried out with 43 of the students in MEng in Civil Engineering in Loughborough University. Eighty one percent of the students were sponsored and had recently completed the sandwich year placement in their sponsoring companies. The aim of this survey was to find out the students’ views on sponsorship after spending some time in industry. All of the respondents stated that sponsored degrees with a sandwich placement are more likely to offer most benefits than non-sponsored degrees or degrees with placements only. The obtained results show a significant uniformity overall in the views of this group of students with the results presented in sections 4.4 to 4.12.

In addition, 43% of this group took part in this research when they were in their first year of their studies and expressed their views and expectations of sponsorship. A closer examination of the views of this particular group of students has been taken in order to understand better their experiences and to see how their views have been changed after being with their sponsors for a period of time. Figure 4-19 illustrates the time they have spent with their sponsoring company so far.
In the early stage of their sponsorship, all the students stated that they would recommend sponsorship to other students and the results from the follow up survey demonstrate that they would still encourage other students to take up sponsorship. They believe they have benefited from it even more than they expected (Figure 4-20).

Gaining industrial experience, practical skills and a guaranteed job were their main reasons for applying for sponsorship. Figure 4-21 presents their indication about the role of the sponsorship element of their programme in gaining each of these factors.
Figure 4-21: Expectations and achievements of sponsorship (Mean)

Figure 4-22 compares the students’ expectations of how the sponsorship element of their programme should contribute to their attainment of learning outcomes with their perception of how it actually supported these learning outcomes. It shows that their links to a sponsor have had a major impact on the development of the learning outcomes of their programmes.

Figure 4-22: Students’ perception of sponsorship support of selected learning outcomes (Mean)
The results are in line with the results presented in the section 4-12: those results were obtained from the distinct groups of students in the first and final year of their studies but these results are gained from the same group of students in a different stage of their studies. The results strongly suggest that opportunities in different areas of the industry need to be offered to the students to allow them to be more challenging and more professional.

Eighty nine percent of them believed that there are no disadvantages with sponsorship. However, 11% said that “being tied with one company and not being able to gain experience in other fields of profession” and “insufficient level of the bursary” are the weaknesses of a number of schemes.

One in nine of the students think “commitment to the company on graduation”, “lack of detailed information about the scheme”, and “the limited choice of the company” may prevent students from applying. They perceived the main barrier is that some schemes require a commitment upon graduation which some people may not feel appropriate. However, seventy eight percent said they do not see any barriers, which prevent the students applying for sponsorship. Students need to be proactive to seek the relevant information and find a sponsoring company. It requires a lot more individual effort and motivation in the departments without the sponsorship schemes.

4.18 Summary

Ninety-four percent of the respondents agreed or agreed strongly that they have benefited from sponsorship. The main advantages are: gaining industrial experience and applying theoretical knowledge in practical applications which make them more employable. These abilities are seen as “must have” attributes in new employees by the employers, since they have major effects on business growth.

Sponsorship provides financial help to students and most likely a job upon completion of their degree. Students also express that sponsorship influenced their decision of the career path within engineering by giving them an insight into the industry as a whole and their chosen discipline in particular. Almost all said they would encourage other students
to apply for sponsorship to help them develop employability skills and gain a clear insight into their future career. The above achievements are perfectly in line with the students’ expectations of sponsorship and the follow up survey revealed that the students feel they have benefited from sponsorship even more than they expected.

Students see sponsorship as an extended interview period which provides the employers with an ideal time to assess candidates.

The academic staff and companies featured in this thesis agree that sponsoring undergraduate students has a positive impact to the development of employability skills in students. The results show that the majority of sponsored students have received a permanent job offer either from their sponsoring company, or other companies. Employability of the sponsored students could have a considerable impact on the attractiveness to future students of sponsorship and sponsored programmes.

Despite all the benefits of sponsorship, sandwich training and financial aid availability, which are two elements of sponsorship schemes, had the least important effect on student choice. The student awareness of the benefits that accrue from sandwich training and financial aid availability needs to be increased.

The graduates who took part in the survey spoke about their experiences of sponsorship. They said sponsorship gave them a network of contacts in industry, a wealth of experience above the non-sponsored graduates, job security, and knowledge of the company which makes starting work upon graduation much easier. They expressed sponsorship supports students while at university and gives them technical support, educational assistance and help if they require it.

The overall impression gained was that there were no major problems but the participants certainly felt that there were areas for improvement. For example, keeping a continuous and supportive relationship between the employers and the department and the students will increase the parties’ benefits.

The majority of students and graduates believe that there are no barriers stopping students applying for sponsorship. However, a number of the respondents said that there is a need
for more accurate and up to date information about the sponsorship schemes including how they work, what they include, what the students expect to do, and what they will gain. They believe it will increase students’ awareness about the benefits from sponsorship and could generate more application for the schemes. However, it should be noted that students do receive an extensive amount of information. The results suggest that in some cases, there is a mismatch between the information provided and what is required, and it is important to know to what extent information is needed and what the best way is to present it to them.
Chapter 5: Academia study

University-industry collaborations in the form of sponsorship of undergraduate engineering degree programmes are still rare in many engineering fields (The Royal Academy of Engineering, 2007). There are many questions regarding this matter including: Why sponsor? What are the benefits? How to set up sponsorship and make it successful? This chapter presents the research findings of a study of academia which sought to answer the above questions. The chapter initially examines the respondents’ perceptions of the effect of sponsorship on the education of engineering graduates. It then analyses their views on sponsorship schemes and issues around the schemes, such as barriers which limit university-industry relationships in this form, and recommends what university and industry can do to overcome the barriers. The chapter finally summarises the added value of sponsorship on academia and gives recommendations regarding how to improve sponsorship schemes.

5.1 Profile of academics

Seven interviews were carried out during October 2008 with senior academic staff across the faculty of engineering in Loughborough University. All interviewees had experience of linking industry with university at the learning and teaching level. The departments involved are listed below:

- Departments with sponsored programmes
  - Electronic & Electrical Engineering
  - Civil & Building Engineering
  - Mechanical & Manufacturing Engineering
- Departments without sponsored programmes
  - Aeronautical & Automotive Engineering
  - Chemical Engineering
A further interview was carried out with the industrial liaison officer, who works in partnership with industry co-ordinators in the faculty of Engineering in Loughborough University to build and enhance relationships between industry and university staff.

5.2 Aim of questions

This section details the aim of questions of the interviews with the academic staff from departments with and without sponsored programmes. Table 5-1 and Table 5-2 present the questions used. A copy of the interviews schedule can be found in Appendix 4.

**Interviews with departments with sponsored students or programmes**

*Section 1* focuses on the role of industrial involvement in the education of undergraduate students from the academic point of view. They were asked how the long term relationship (>one year) between the students and employer would improve students’ technical and professional skills and their views about their future career. Next, questions were raised about the number and quality of graduates available in their discipline to meet industry’s needs and how offering sponsored undergraduate programmes would improve the quantity and quality of graduate engineers, and the quality of university programmes.

*Section 2* determines academics’ views on the sponsorship schemes and if the reality of sponsorship meets their expectations. The questions were aimed at determining the benefits, strengths and weaknesses of the sponsorship schemes, how the schemes could be improved, and how the students’ awareness of sponsorship could be increased.

*Section 3* relates to the University-Industry relationship. Firstly the number of companies that departments are linked with through undergraduate sponsorship was obtained and then, the academics were asked about the important factors for choosing their partner companies and how these companies could be encouraged to sponsor students and degree programmes. The next questions asked opinions about whether there are any barriers which prevent more companies, departments and students getting involved in sponsorship schemes and, if so, what departments and what employers could do to
overcome the barriers. Finally in Section 4, the participants were invited to express any additional views and comments on these issues raised during the interview.

Table 5-1: List of interview questions- Departments with sponsored students or programmes

<table>
<thead>
<tr>
<th>Section 1: the role of sponsorship</th>
</tr>
</thead>
<tbody>
<tr>
<td>Please indicate your agreement with the following statements about comparison of sponsored students and non sponsored students on their graduation: sponsored students:</td>
</tr>
<tr>
<td>• have better understanding of their future career as an engineer</td>
</tr>
<tr>
<td>• have better knowledge of the commercial implication of engineering decisions</td>
</tr>
<tr>
<td>• have better communication skills</td>
</tr>
<tr>
<td>• have better team-working skills</td>
</tr>
<tr>
<td>• are more productive</td>
</tr>
</tbody>
</table>

| Are there sufficient graduates available in your discipline to meet industry’s needs? |
| Is the quality of available graduates in your discipline sufficient to meet industry’s needs? |
| Do you think offering sponsored undergraduate programmes would improve: |
| • your graduate recruitment |
| • quantity of graduate engineers |
| • quality of graduate engineers |
| • quality of university programme |

| Please indicate your agreement with the following statements: |
| • sponsoring undergraduate students is an opportunity for employers to evaluate potential employees at early stage of their careers |
| • the number of sponsored students is affecting the number of graduates available for employment for other companies |

<table>
<thead>
<tr>
<th>Section 2: The sponsorship scheme</th>
</tr>
</thead>
<tbody>
<tr>
<td>In general, how do you feel your department has benefited from the sponsorship scheme?</td>
</tr>
<tr>
<td>What has your department gained most from the sponsorship scheme?</td>
</tr>
<tr>
<td>What aspects of the sponsorship scheme have influenced or impressed you the least?</td>
</tr>
<tr>
<td>What benefits do you think sponsored students gain from the sponsorship scheme?</td>
</tr>
<tr>
<td>What benefits do you think the sponsoring companies gain from the sponsorship scheme?</td>
</tr>
<tr>
<td>How do you rank the relationship between university and industrial contacts?</td>
</tr>
</tbody>
</table>
Table 5-1: List of interview questions- Departments with sponsored students or programmes – continued

<table>
<thead>
<tr>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>In general, does the reality of sponsorship meet your expectation?</td>
</tr>
<tr>
<td>In your opinion are there any areas of the sponsorship scheme that could be improved?</td>
</tr>
<tr>
<td>How could the students’ awareness of sponsorship be increased?</td>
</tr>
</tbody>
</table>

**Section 3: University-Industry relationship**

<table>
<thead>
<tr>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>How many companies are you linked with through undergraduate sponsorship?</td>
</tr>
<tr>
<td>What factors are important when choosing a partner company?</td>
</tr>
<tr>
<td>How can industry be convinced to sponsor students?</td>
</tr>
<tr>
<td>In your opinion, do you think there are any barriers which prevent companies offering sponsorship?</td>
</tr>
<tr>
<td>In your opinion, do you think there are any barriers which prevent department offering more sponsored programmes?</td>
</tr>
<tr>
<td>In your opinion, do you think there are any barriers which prevent more students to apply for sponsorship?</td>
</tr>
<tr>
<td>What can Departments do to overcome the barriers?</td>
</tr>
<tr>
<td>What can employers do to overcome the barriers?</td>
</tr>
</tbody>
</table>

**Interviews with departments without sponsored programmes**

Section 1 determines the quality and quantity of available graduates and how staff think that sponsorship could improve these factors as well as quality of university programmes and their graduate recruitment. Section 2 determines the extent of their relation with industry and if they intend to extend it. Section 3 relates to barriers which prevent departments offering sponsorship, what staff think might prevent more companies and students getting involved in sponsorship, and what Departments and employers can do to overcome the barriers. At the end of the interviews the interviewees were asked for any additional comments.
### Table 5-2: List of interview questions- Departments without sponsored students or programme

**Section 1: the role of sponsorship**

<table>
<thead>
<tr>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are there sufficient graduates available in your discipline to meet industry’s needs?</td>
</tr>
<tr>
<td>Is the quality of available graduates in your discipline sufficient to meet industry’s needs?</td>
</tr>
<tr>
<td>Do you think offering sponsored undergraduate programmes would improve:</td>
</tr>
<tr>
<td>• your graduate recruitment</td>
</tr>
<tr>
<td>• quantity of graduate engineers</td>
</tr>
<tr>
<td>• quality of graduate engineers</td>
</tr>
<tr>
<td>• quality of university programme</td>
</tr>
<tr>
<td>Are there any sponsored students in your programme?</td>
</tr>
</tbody>
</table>

**Section 2: The sponsorship scheme**

<table>
<thead>
<tr>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>In general, do you feel your department could benefit from the sponsorship scheme?</td>
</tr>
<tr>
<td>What form do you think these benefits could take?</td>
</tr>
<tr>
<td>Have you ever considered introducing a formal sponsorship scheme?</td>
</tr>
<tr>
<td>Which of the following factors would influence your decision not to develop employer sponsorship in your department:</td>
</tr>
<tr>
<td>• Time commitment</td>
</tr>
<tr>
<td>• Staff commitment</td>
</tr>
<tr>
<td>• Company policy</td>
</tr>
<tr>
<td>• Company policy</td>
</tr>
<tr>
<td>• University regulations</td>
</tr>
<tr>
<td>• Lack of interest from employers</td>
</tr>
<tr>
<td>• Lack of interest in the Department</td>
</tr>
<tr>
<td>• Lack of interest from students</td>
</tr>
<tr>
<td>What other barriers might prevent department offering sponsored programme?</td>
</tr>
</tbody>
</table>

**Section 3: University-Industry relationship**

<table>
<thead>
<tr>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>In your opinion, do you think there are any barriers which prevent companies offering sponsorship?</td>
</tr>
<tr>
<td>In your opinion, do you think there are any barriers which prevent more students to apply for sponsorship?</td>
</tr>
<tr>
<td>What can department and employers do to overcome the barriers?</td>
</tr>
</tbody>
</table>
5.3 The impact of sponsorship on students from an academic perspective

Universities have many different ways of linking students to employers, but this research aims to identify the impact of integrating “long term” relationships of up to four years into the students’ university experience. This section starts with a comparison of skills of the sponsored graduates with those of other graduates from the academics’ point of view.

As Table 5-3 shows, the interviewees agreed that continuing links between students and employers give the students a better understanding of their future career as an engineer and better knowledge of the commercial implication of engineering decisions. Sponsorship also makes them more productive and has a significant affect in developing their professional skills such as communication and team-working.

<table>
<thead>
<tr>
<th>sponsored students:</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>have better understanding of their future career as an engineer</td>
<td>5.5</td>
</tr>
<tr>
<td>have better knowledge of the commercial implication of engineering decisions</td>
<td>5.5</td>
</tr>
<tr>
<td>have better communication skills</td>
<td>5.5</td>
</tr>
<tr>
<td>have better team-working skills</td>
<td>5.5</td>
</tr>
<tr>
<td>are more productive</td>
<td>5.0</td>
</tr>
</tbody>
</table>

The interviewees were then asked about the number and quality of graduates and how they think that offering sponsored undergraduate programmes would improve the quantity and quality of graduate engineers and the quality of university programmes. The results (Table 5-4) show that there are not sufficient graduates available in some disciplines to meet industry’s needs. One interviewee in the Chemical Engineering discipline stated:

“it is very difficult to recruit students from schools for some subject areas and this issue remains an ongoing challenge for us.”
In addition, the interviewees stated that in some areas employers feel the quality of available graduates is not sufficient to meet their specific industry needs. These findings are in line with other studies of recruitment and skills needs, which revealed that many employers had difficulty in filling positions in the engineering related areas (Roberts, 2002; The Royal Academy of Engineering, 2007).

**Table 5-4: Academia’s view on the quality and quantity of graduates**

<table>
<thead>
<tr>
<th>Department</th>
<th>Are there sufficient graduates available?</th>
<th>Is the quality of available graduates satisfactory?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civil &amp; Building Engineering</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Electronic &amp; Electrical Engineering</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Mechanical &amp; Manufacturing Engineering</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Aeronautical &amp; Automotive Engineering</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Materials</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Chemical Engineering</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

The interviewees agreed that sponsored programmes would noticeably improve the quality of graduate engineers and university programmes (Figure 5-1). Furthermore, they would improve the department’s recruitment which has a positive effect on marketing and attracting more students to the programmes.

**Figure 5-1: Impact of the sponsored programmes on students and department (Mean)**
5.4 Benefits of the sponsorship schemes to the parties

The participating academics and employers have strong links which work very well. In general, interviewees believed their departments have benefited from the sponsorship scheme considerably and the reality of the schemes meets their expectations. They quoted the following as outcomes from sponsorship which are aligned with their expectations:

- attracting more students,
- creating training opportunities for their students,
- creating job opportunities for their graduates,
- opportunities to form relationships with industry, and
- getting input from industry and benefiting from their expertise.

One interviewee added: “it [sponsorship] could bring more opportunities to university in research or offering and selling short courses.”

The interviewees perceive that the sponsored programmes are a real commitment to the alignment of courses to the needs of industry. Ideas for curriculum, networking, and funding support to develop the programmes are also regarded as benefits. Also the link with Loughborough University is promoted on some of the companies’ web sites and this may eventually lead to more students applying to study engineering at Loughborough University.

The interviewees were then asked to list benefits from the partnership to the sponsored students and the sponsoring companies. Academics expressed that developing professional skills and gaining work experience are crucial factors in the undergraduate life cycle and that linking students with employers throughout their degree studies provides students with opportunities to develop these skills. One senior academic noted: “sponsorship make students to have a mature and professional outlook after graduation”. They will also be familiar with the work environment and obtain a better understanding of their future careers. Job prospects and extra funding are other cited benefits to the students.
The interviewees’ quotes indicated “access to young and bright students”, “increased reputation”, and “recruitment of good graduates” as the main benefits to the employers. Consortium companies gain an insight of how the department works and have access to well-trained students with the opportunity to assess their potential employees over a longer period. The interviewees pointed that the number of sponsored students is affecting the number of graduates available for employment for other companies. Therefore, sponsoring undergraduate students could have an important effect on the employers’ recruitment methods by giving them access to talented students and an opportunity to evaluate potential employees at the early stage of their careers.

5.5 Possible sponsorship scheme improvements

This section explains the interviewees’ opinion regarding the areas of the sponsorship schemes that could be improved, based on their own personal experience, by asking them: “In your opinion are there any areas of the sponsorship scheme that could be improved?” In general, there were no major problems but that participants felt that there was room for improvement. For example, sometimes it is difficult to get information for large companies with different business units and students and university contacts refer to different people. There is a need of an easily identified single point contact through which sponsorship enquiries are dealt and the department needs to know the contact details of the companies and have an updated database of the contacts.

One key issue in sponsorship is: “does it give value for money?” Some companies and departments do not track graduates, and therefore they do not know if sponsorship is beneficial, especially from an economic point of view. It is important for both parties to evaluate the schemes and provide all information and values for reviews. It is especially important for foreign owned companies, who might not be familiar with such schemes, to know about the success of programmes, so that they can extend their link with the sponsored programmes.

Some participants also suggested that facilitating and managing administrative issues, such as dealing with queries in departments and companies, and getting more students to apply would improve the schemes. Also, if the employers intend to offer employment to
the students it should be offered immediately after the placement year in order to give students enough time to decide if they want to stay with their sponsors or not. The results show that the companies in the construction industry did offer students job after the placement year but that the majority of companies in the systems engineering discipline delayed offering jobs until the students’ graduation.

5.6 The important factors for setting up sponsorship schemes

The partnership between companies and universities is a challenge to both sides, as they are not natural partners and have different missions and cultures (Lambert, 2003). The research sought to explore the academics’ view about what factors are important for the university departments to choose their partner companies and how the employers can be encouraged to be involved in the learning and teaching of undergraduate students through the sponsorship schemes. The results provide an understanding of how university-employers relations could be set up by identifying the parties’ requirements and their expectations.

The most common responses from the academic staff regarding the choice of their partner companies centred on the alignment of the course contents with companies’ requirements and personal relationship between department and company contacts.

The interviewees were then asked, based on their own personal experience, how the employers can be encouraged to sponsor degree programmes and undergraduate students. The important factors identified by interviewees were as follows:

- sufficient supply of good quality graduate,
- making sure of getting the best students,
- giving employers early access to good engineering students for the purpose of helping them recruit, and
- providing more successful case studies and examples of companies who sponsor students.

Therefore, when setting up and running the sponsorship links it is vital to recognise industry needs and reflect them in the course contents, build the links and, more
importantly maintain them, and finally provide the information about the added values of sponsorship to the stakeholders.

5.7 Barriers which limit involvement in sponsorship

This section gives the interviewees’ opinion about barriers which prevent employers and departments offering more sponsorship and students from applying for sponsorship. “Cost” is identified as one of the barriers which stop companies offering more sponsorship. It should be noted that it is not the real cost, as having students is beneficial for the employers. One interviewee stated “the cost involved is not real cost; it is perceived cost, because students contribute a lot to the company.” Also, staff and time commitment and lack of information about what is happening in university and what university offers, are other factors for not offering sponsorship.

The interviewees believed that perception of commitment to the sponsor following graduation and lack of awareness and information about sponsorship are main reasons for students not to apply for it.

The Departments of Aeronautical and Automotive Engineering, Chemical Engineering, and Institute of Polymer Technology and Materials Engineering do not run sponsored programmes. However, they have different and strong links with industry and the majority of students get sponsorship after their placement. The academics who took part in this research were asked on a scale of 1-6 (1 = Not at all, 6 = Considerably) how the following factors would influence their decision not to develop employer sponsorship in their department: time commitment, staff commitment, company policy, university regulations, lack of interest from employers, lack of interest in the department and lack of interest from students (Figure 5-2).
One of the main challenges for establishing new sponsorship schemes is increasing the demand from employers. It is very important to make them aware of the benefits that can arise from this type of collaboration with academia, especially those employers who do not have experience of working with universities at undergraduate level. Creating some case studies will help academics to approach industry staff and show industry the benefits which can be a starting point for successful partnerships and promote demand from employers.

In addition to the issue noted above, the research also reveals concern amongst the interviewees about the staff and time commitment needed to introduce and operate the new schemes. Staff have to spend lots of time dealing with sponsorship and administration issues.

**5.8 What can be done to overcome the barriers?**

Sponsorship brings mutual benefits to departments and the university and they can do more to give sponsored courses a high profile and make government and educational sectors more aware of these courses. Figure 5-3 summarises what the university and employers could do to improve the university-employer links. The department should advertise to the public through journals, magazines and case studies. Providing easy
access and clear information about the schemes including how they work and what is involved in the scheme, would encourage employers and students engagement in the sponsorship schemes.

Figure 5-3: Universities’ and employers’ tasks to disseminate sponsorship

To get more students to apply for sponsorship, schemes should be made more visible as it is important how easily students can access information. One interviewee said: “for an 18 year old student, searching 1000s of websites, visibility and gaining information easily are very important.” Clear and direct links for sponsorship on employers and departments’ websites and even high level links on the faculty and university’s websites could help students to find the information more easily. Lecturers can also promote sponsorship and encourage students to apply for it. Parents, schools and career services should be made aware of the sponsored courses and the related information has to be available for them.

Academic staff who deal with sponsorship issues should provide clear and up to date and prompt information for the partner companies and follow up all aspects of the procedures and not leave it to the companies. Therefore, it is vital to know the detailed contacts of companies and regularly update the contact details database.

It was also suggested that some administrative issues can be managed. For example, departments can design dynamic and reactive websites to avoid delays in updating the websites by having to ask the web master for every single change.
Companies should be made more aware about the success of programmes, especially economic benefits, in order to encourage them to extend their links with universities through sponsorship.

5.9 Summary

At the time of the survey, October 2008, the respondents agreed that there is a shortage of good quality graduates to meet industry’s needs in different engineering disciplines. They see sponsorship as a way which attracts more students on the courses. Sponsorship provides students with opportunities to gain experience of the work environment and develop their professional skills, all of which make them high quality engineers on graduation. Sponsorship involves valuable opportunities to learn in the workplace alongside academic study. It can also help meet some of the costs of higher education and is one of the best ways of avoiding a mountainous student debt. Sponsoring students for a fixed period is an excellent way to develop a student’s motivation and bring fresh ideas into their sponsoring company.

Sponsorship adds significant values to the department in form of marketing, improving the quality of their programmes and funding further activities. It increases a university’s relationship with companies and thus provides better information on industry trends and understanding what the focus in industry is. Inputs from industry help to identify gaps in graduates’ skills and reveal new opportunities in technology. It also improves employers’ recruitment, increases their reputation in the society and spending time with the company gives students better experience and knowledge.

It is obvious that the sponsorship schemes are beneficial for all the parties involved, but employers and students cannot set up the schemes. It is therefore, the academic’s responsibility to launch new schemes, which requires lots of time and effort. The schemes are usually established by the enthusiasm of individuals and it is important to make sure that the enthusiasm and dedication for the programme do not dissipate when those individuals move on.
In addition to this, further evaluation of sponsorship schemes is required to highlight the benefits which arise from this type of University-Industry links. More successful case studies need to be highlighted to increase awareness of the benefits of sponsoring students and undergraduate programmes.
Chapter 6: Industry study

This chapter presents the research findings of an industry study revealed by interviews and survey data in four main areas: industry incentives to be involved in sponsorship, graduates’ skills from an industry point of view; the benefits, strengths and weaknesses of the sponsorship schemes; and sponsorship support of graduates’ employability skills. The survey and interviews were carried out between February 2007 and May 2008. The chapter begins with an overview of the company profiles and explores the employers’ reasons for sponsoring students and degree programmes. It follows by comparing the skills of sponsored graduates with other graduates and analysing companies’ views on the sponsorship schemes. Finally, the chapter looks at the important factors that employers consider when they offer a job to a candidate. The chapter summarises the influence of sponsorship on the employers in terms of their achievements and recommendation regarding scheme improvements.

6.1 Profile of employers

The industry study involved 11 interviews with senior managers in major companies in civil and building engineering. In addition 23 companies in construction, mechanical and manufacturing engineering, and systems engineering completed the online questionnaire. The companies involved are listed below:

- Companies who sponsoring Loughborough students at the MEng in Civil Engineering, CEM, and CMQS degree programmes:
  - Laing O’Rourke
  - Sir Robert McAlpine
  - Ringway Group
  - Edmund Nuttall (now BAM Nuttall)
  - Scott Wilson
• Galliford Try
• Bechtel
• Dean and Dyball Rail
• Taylor Woodrow
• Carillion
• Tony Gee and Partners
• Birse Civils
• Walter Lilly and Company
• Kier Group
• Morgan Ashurst
• Costain

• Companies who employ Loughborough students from the MEng in Civil Engineering for year out placements (without sponsorship):
  • JMP
  • White Young Green Group
  • Morgan Professional Services
  • Adept management
  • Marks Heeley and Brothwell
  • Interserve Project Services

• Companies who are sponsoring Loughborough students from MEng in Manufacturing and Mechanical Engineering
  • IMI
  • Indesit
  • Perkins
  • Rolls-Royce
  • Siemens Industrial Turbomachinery

• Companies who are sponsoring Loughborough students in from MEng in Systems Engineering
  • BAE Systems
• Companies who are sponsoring AutoCRC scholars in automotive industry
  • Futuris Automotive Group
  • GKN Aerospace
  • GM Holden

6.2 The questionnaires and interviews

This section details the questions for the interviews with employers who do or do not offer sponsorship. Table 6-1 and Table 6-2 summarise the questions used. A copy of the interview template can be found in Appendix 3.

**Interviews with sponsoring companies**

*Section 1* obtains information about employers’ main reasons in offering sponsorship. During the literature review some factors had been identified as benefits of university-industry partnerships through sponsorship, work placements and summer internships for employers. The partnerships give companies opportunities to recruit high quality graduates, be involved in teaching of students and enhancing their image (Gordon, Hutt, & Pearson, 1985a; The Royal Academy of Engineering, 2007; CBI, 2009b). The first question asks how important these factors are in employer decisions to offer sponsorship. They were then asked about their preference for recruiting sponsored graduates or direct entrant engineering graduates and their preferred relation type (sandwich placements only or sponsorship) with the university at undergraduate level.

*Section 2* focuses on a comparison of sponsored graduates’ skills with those of non-sponsored graduates on graduation. The aim of this section is to find out how long term relationships (>one year) between students and employers could improve students’ technical and professional skills, and their views and commitments to their future career.

*Section 3* determines employers’ views on the sponsorship schemes. *Section 4* focuses on the main reasons to offer a job to a candidate. Participants were then invited to express any additional views and comments on the issues raised during the interview.
Table 6-1: List of the survey questions- Employers who offer sponsorship

<table>
<thead>
<tr>
<th>Section 1: Your decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Please indicate how important each of the following are in offering sponsorship.</td>
</tr>
<tr>
<td>• Cost effective recruitment method</td>
</tr>
<tr>
<td>• To be involved in teaching/training of graduates</td>
</tr>
<tr>
<td>• To ensure a supply of future engineers</td>
</tr>
<tr>
<td>• To ensure recruitment of enough well trained graduates</td>
</tr>
<tr>
<td>• To increase company’s reputation</td>
</tr>
<tr>
<td>• To minimise overall training costs</td>
</tr>
<tr>
<td>Do you prefer to recruit sponsored students or direct entrant engineering graduates?</td>
</tr>
<tr>
<td>Do you prefer to offer sandwich placements only or sponsorship?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Section 2: Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Please indicate your agreement with the following statements about comparison of sponsored graduates and direct entrant graduates:</td>
</tr>
<tr>
<td>• have more ability to apply theory in practice</td>
</tr>
<tr>
<td>• have better knowledge of the Engineering</td>
</tr>
<tr>
<td>• have better knowledge of the commercial implication of engineering decisions</td>
</tr>
<tr>
<td>• have better communication skills</td>
</tr>
<tr>
<td>• have better team-working skills</td>
</tr>
<tr>
<td>• are more productive</td>
</tr>
<tr>
<td>• progress further and faster in the company</td>
</tr>
<tr>
<td>• stay longer with the company</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Section 3: The sponsorship scheme</th>
</tr>
</thead>
<tbody>
<tr>
<td>In general, how do you feel your company has benefited from the sponsorship scheme?</td>
</tr>
<tr>
<td>What has your company gained most from the sponsorship scheme?</td>
</tr>
<tr>
<td>What aspects of the sponsorship scheme have influenced or impressed you the most?</td>
</tr>
<tr>
<td>What aspects of the sponsorship scheme have influenced or impressed you the least?</td>
</tr>
<tr>
<td>What benefits do you think sponsored students gain from the sponsorship scheme?</td>
</tr>
<tr>
<td>What benefits do you think the Department gains from the sponsorship scheme?</td>
</tr>
<tr>
<td>What factors are important when choosing a degree programme to sponsor?</td>
</tr>
<tr>
<td>What factors are important when choosing a university to be linked with?</td>
</tr>
<tr>
<td>How many universities are you linked with through undergraduate sponsorship?</td>
</tr>
</tbody>
</table>
Table 6 1: List of the survey questions- Employers who offer sponsorship- continued

<table>
<thead>
<tr>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>How long have you been linked with Loughborough University?</td>
</tr>
<tr>
<td>Do you intend to continue your relation with Loughborough University?</td>
</tr>
<tr>
<td>Are your sponsorship needs satisfied by the number of students available?</td>
</tr>
<tr>
<td>Would you like to increase the number of sponsorships offered to the students?</td>
</tr>
<tr>
<td>How do you rank the relationship between sponsored students and industrial contacts?</td>
</tr>
<tr>
<td>How could be improved?</td>
</tr>
<tr>
<td>How do you rank the relationship between university and industrial contacts?</td>
</tr>
<tr>
<td>How could it be improved?</td>
</tr>
<tr>
<td>In general, does the reality of sponsorship meet your expectation?</td>
</tr>
<tr>
<td>How could the students’ awareness of sponsorship be increased?</td>
</tr>
<tr>
<td>In your opinion are there any areas of the Loughborough University sponsorship scheme that could be improved?</td>
</tr>
</tbody>
</table>

**Section 4: Job offer**

How important are the following factors in your decision to offer a job:
Academic performance, Academic reputation of university, Professional skills, Personality,
Communication skills, Team working, Motivation, Creativity

**Interviews with non sponsoring companies**

Section 1 determines the type and extent of their relation with University, if they intend to extend it and if they would consider becoming a part of the Loughborough sponsorship scheme in the future. Section 2 covers the barriers which prevent offering sponsorship. Section 3 obtains views about the quality and quantity of available graduates and how sponsorship could improve these factors. Section 4 determines if the sponsoring of students by other companies is affecting their recruitment and also ascertains the proportion of jobs offered to students who completed their work placements in their company. Interviewees were finally asked for any additional comments.
<table>
<thead>
<tr>
<th><strong>Section 1: type and extent of the company’s relation with University</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>How long have you been offering work placement to Loughborough students?</td>
</tr>
<tr>
<td>How many places do you offer to Loughborough students each year?</td>
</tr>
<tr>
<td>Do you offer any sponsorship to undergraduate students from other universities?</td>
</tr>
<tr>
<td>Do you offer sponsorship to Loughborough students after work placement?</td>
</tr>
<tr>
<td>Do you know about the Loughborough sponsorship scheme?</td>
</tr>
<tr>
<td>Would you like to receive further information regarding the scheme?</td>
</tr>
<tr>
<td>Have you ever been involved in the Loughborough University sponsorship scheme?</td>
</tr>
<tr>
<td>If yes why did you terminate your links?</td>
</tr>
<tr>
<td>Would you consider becoming a part of the Loughborough sponsorship scheme in the future?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Section 2: The sponsorship scheme</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Which barriers prevent offering sponsorship?</td>
</tr>
<tr>
<td>Please indicate the effect of each of the following in your decision not to offer sponsorship :</td>
</tr>
<tr>
<td>• Overall cost</td>
</tr>
<tr>
<td>• Time and resources commitment</td>
</tr>
<tr>
<td>• Company policy</td>
</tr>
<tr>
<td>• University rules and conditions</td>
</tr>
<tr>
<td>• Lack of information</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Section 3: The role of sponsorship on the quality and quantity of graduates</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Are there sufficient graduates available to meet your company’s needs?</td>
</tr>
<tr>
<td>Is the quality of available graduates sufficient to meet your company’s needs?</td>
</tr>
<tr>
<td>Do you think long term relation between students and industry would improve:</td>
</tr>
<tr>
<td>• Your graduate recruitment</td>
</tr>
<tr>
<td>• Quality of graduate engineers</td>
</tr>
<tr>
<td>• Quality of university programme</td>
</tr>
<tr>
<td>Do you have a graduate development programme in your company?</td>
</tr>
</tbody>
</table>
Table 6.2: List of the survey questions - Employers who do not offer sponsorship – continued

Please indicate your agreement with the following statements:

- Providing industrial work placement is an opportunity to evaluate potential employees at early stage of their careers
- Sponsoring undergraduate students is a better opportunity to evaluate potential employees at early stage of their careers
- The number of sponsored students is affecting the number of graduates available for employment for other companies

Section 4: Job offer

What portion of jobs have you been offered in the past to students who completed their work placements in your company?

How important are the following factors in your decision to offer a job:
Academic performance, Academic reputation of university, Professional skills, Personality, Communication skills, Team working, Motivation, Creativity

6.3 Industry incentives to be involved in sponsorship

The concerns over shortages of engineering graduates with the right skills entering industry is increasing. Shortage of highly skilled graduates increases recruitment costs and impacts on the performance of UK industry. Industry should therefore supply more feedback on the quality and education of graduates to make sure the changing requirements of industry are recognised and reflected in engineering degree programmes (The Royal Academy of Engineering, 2007).

The research sought to identify respondents’ expectations of sponsorship regarding its effect on their companies and education of engineering students by asking three questions which are presented here. The first question asked respondents to rate on a scale of 1-6 (1 = Not important, 6 = Very important) how important each of the following are in offering sponsorship: to ensure recruitment of enough highly trained graduates, to ensure a supply of future engineers, to be involved in teaching/training of graduates, to increase company’s reputation, cost effective recruitment method, to minimise overall training costs. The results are presented in Figure 6-1.
Eighty seven percent of the companies stated that the demand for engineering graduates is greater than supply. This is in agreement with the findings of a recent study (Spinks, Silburn, & Birchall, 2006) which showed building services, civil and systems engineering are difficult areas for recruitment. In addition to this, in a large and complex industry such as construction, in which the demand for its services is highly variable, employee supply is challenging (Raiden et al., 2009). Since the 1960s, it has been recognised that sponsorship enable employers to employ an adequate number of appropriately qualified people (Gordon, Hutt, & Pearson, 1985b). As the Figure 6-1 shows 93% of companies still agree that sponsoring students during undergraduate studies will ensure the recruitment of enough well trained graduates.

Attracting and maintaining talented employees are key features of successful businesses (Loosemore et al., 2003). The respondents indicated that sponsorship helps to attract the talented students that industry need and that it ensures the supply of graduates for industry in the future. In addition, sponsorship gives employers the opportunity to be involved in the teaching and training of students. This result supports the previous study by Gordon et al. (1985) which showed that sponsorship has an important role in increasing the ‘pipeline’ of qualified engineering graduates to industry. Also, employers can maintain a close relationship with university and students which increases a company’s reputation in society.
Recruitment is a very expensive process and 75% of the employers see sponsorship as a cost effective recruitment method, which gives them the opportunity to work closely with a university in order to identify the talented candidates they need. One interviewee said “when they [sponsored graduates] graduate they hit the ground running and are highly cost effective”. Other important reasons for offering sponsorship that were mentioned by employers are “sponsored students are a source of flexible employees and they are very helpful during the peak holiday time for company” and “sponsoring students and degree programmes make engineering more attractive and relevant to students”. Although the cost of training is high, the employers gain long-term benefits by offering sponsorship to the undergraduate students.

Cronbach’s Alpha was chosen to estimate the reliability of this question and the score is 0.88 which is greater than 0.70 and is considered “acceptable” (section 3.7).

The results of a statistical analysis (Table 6-3) show no significant difference between employers’ overall views about the main reasons for offering sponsorship in different engineering disciplines. As explained in the Methodology chapter (section 3.7) a statistical significance level of 0.05 was used for all the analyses.

Table 6-3: Comparison of views of companies in different engineering disciplines in offering sponsorship

<table>
<thead>
<tr>
<th>Test Statistics(a,b)</th>
<th>To reduce recruitment cost</th>
<th>To be involved in teaching of graduates</th>
<th>To supply future engineers</th>
<th>To recruit enough graduates</th>
<th>To increase company's reputation</th>
<th>To minimise overall training costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-Square</td>
<td>2.14</td>
<td>0.75</td>
<td>2.08</td>
<td>0.63</td>
<td>2.43</td>
<td>2.95</td>
</tr>
<tr>
<td>df</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>p value</td>
<td>0.34</td>
<td>0.67</td>
<td>0.35</td>
<td>0.73</td>
<td>0.30</td>
<td>0.23</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>a</th>
<th>Kruskal Wallis Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>b</td>
<td>Grouping Variable: Engineering discipline</td>
</tr>
</tbody>
</table>

Figure 6-2 shows that ensuring recruitment of enough well trained graduates, providing future engineers for industry, being involved in teaching of graduates, and increasing company’s reputation are the most important factors in offering sponsorship among different engineering disciplines.
Figure 6-2: Important factors in offering sponsorship by respondents' group (Mean)

(1= Not important 6=Very important)
Although there is an overall consistency in the views of the employers taking part, the research includes a closer examination of two particular groups of employers in order to understand better their particular experiences of sponsorship.

The first group is companies who sponsor undergraduate students through their degree studies and the second group is companies who sponsor undergraduate students just through their final year of their studies. There is a significant difference in the groups’ views about the importance of recruitment of enough well trained graduates (Table 6-4). A statistical significance level of 0.05 was used and the $p$ value for this factor is less than 0.05.

<table>
<thead>
<tr>
<th>Mann-Whitney U</th>
<th>To reduce recruitment cost</th>
<th>To be involved in teaching of graduates</th>
<th>To supply future engineers</th>
<th>To recruit enough graduates</th>
<th>To increase company’s reputation</th>
<th>To minimise training costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z</td>
<td>-0.94</td>
<td>-1.03</td>
<td>-0.18</td>
<td>-3.30</td>
<td>-0.38</td>
<td>-0.66</td>
</tr>
<tr>
<td>$p$ value</td>
<td>0.35</td>
<td>0.11</td>
<td>0.85</td>
<td><strong>0.00</strong>*</td>
<td>0.70</td>
<td>0.51</td>
</tr>
</tbody>
</table>

Table 6-4: Comparison of views of employers who offer long term sponsorship and employers who offer short term sponsorship

The results show (Figure 6-3) that the first group agreed that sponsorship has an important effect on their recruitment, as well as an enhancement of their company’s reputation and supply of future engineers for the profession. The second group sees sponsoring final year students as an important way to be involved in the teaching and training of them. Although, this looks to be illogical as one year sponsorship would have less involvement in teaching than those who sponsor for the whole programme. However, further research is required as the sample size was small.

The $p$ value for all other factors is greater than 0.05 and therefore there is not a significant difference in two groups’ views about these factors. Though, as Figure 6-3 illustrates in overall, the employers believe longer sponsoring time is more likely to influence them and the industry than a shorter sponsoring time.
The second question explored the companies’ preference in recruiting sponsored graduates in comparison with direct entrants. Seventy eight percent of companies stated they prefer to recruit sponsored graduates rather than direct entrant engineering graduates, because they get to know and meet the students over several years. In addition the students already have knowledge and experience of the company and the type of projects so that they know what to expect when they start work and have loyalty with the company.

Eleven percent of companies stated they would prefer to recruit sponsored graduates but there are not enough of them available and therefore they recruit from both groups, and 11% of companies have no preference as they have their own development programme and all employees have to go through this programme.

The third question asked the respondents whether they prefer to offer sponsorship or sandwich placements only. Twenty percent of companies offer both, but all companies in this study have preference for sponsorship routes rather than placements alone as it
allows them to target potential employees much earlier and secure them for the future. In addition to this, sponsored students see themselves as a part of the business, not just as having a job.

6.4 The main factors in sponsoring a degree programme

This section looks at the main factors that convince employers to sponsor degree programmes. It draws on the interviews and the responses to an open-ended question within the survey which invited respondents to say what factors are important when choosing a degree programme to sponsor and a university to be linked with.

A frequent theme revealed by the interviews and survey data is the nature of the degree programme, including its direct association with business needs, how applicable and useful it will be in the workplace, and how attractive it will be to potential students. They look for courses which generate students with knowledge of engineering theories and ability of involvement at a practical level. This was strongly revealed in the survey data where the majority of respondents stressed the calibre of students and quality of degree courses are important factors for sponsoring a degree. The following factors are also important when they choose a university to be linked with: “quality of graduates and university”, “reputation of the university”, “institution affiliations”, “past success and history of relationships”, and “geographical issues”.

Forty four percent of companies are linked with more than four universities, 11% with two, and 33% with just one university (i.e. Loughborough University). Seventy six percent of the employers in the scheme have been linked with Loughborough University for more than four years.

At the time of the survey, 89% of sponsors expressed that their sponsorship needs are satisfied by the number of students available, but they will increase the number of sponsorships they offer if demand increases. However, 11% stated there is a need to generate more applications for sponsorship as they fail to meet their recruitment target.
6.5 Graduates’ skills

Being sponsored by a company is a good opportunity for students to spend time in the company during their vocational placement and summer work to develop their skills. Several years experience put the sponsored students ahead of the graduates who have not been in industry.

In fact, work experience for students is organised in different ways, ranging from programmes providing students with short term placements to programmes providing them with four years of sponsors’ support. The results from students who are not in the sponsorship schemes, but the majority of whom have taken a 12 months placement, shows that over 87% of them thought that they could benefit from a four year sponsorship programme and they would recommend it to other students. They expressed the belief that the benefits could be in the form of gaining extra funding, work experience and future career.

Figure 6-4 shows what the employers think about sponsored graduates’ skills on their graduation, in comparison with non-sponsored graduates. As the results show, the sponsored graduates have better knowledge of engineering disciplines and a greater ability to apply theory in practice, both of which are very important skills in preparing graduates to face real world challenges (The Royal Academy of Engineering, 2007). The respondents mentioned that sponsored students contribute more quickly to the company and that the learning process is shorter for them. Also, they are good quality committed workers who understand the industry and have a long term career commitment. However, progress opportunities are equal for all employees.

Reliability score was calculated to determine the consistency of this question’s variables. The Cronbach’s reliability score for this scale was 0.93(>0.70) which indicates that the reliability for these variables are very high (section 3.7).
Figure 6-4: Employers’ perception of sponsored compared to non-sponsored graduate skills
6.6 The benefits of sponsorship to employers

All the research participants stated that they benefited from the sponsorship scheme. Sponsorship is a stable recruitment source of high quality graduates. It has done very well in comparison with other recruiting methods and sponsored students are worth recruiting into the business on graduation. One senior manager stated:

“We get better quality graduates by sponsoring them during their studies than if we wait until the year they graduate, by which time the best graduates have been picked up by other sponsoring companies.”

Other advantages of sponsorship to employers are in the form of: “access to young, bright and qualified students who are enthusiastic and have a different view of how things can be done”, “enhanced reputation” and “close contact with the university and the student at very early stage of their studies”.

“The organization of the scheme (well set up and taking the hassle away from the companies)”, “the quality, calibre and enthusiasm of the students”, and “willingness of the academic team at Loughborough University to listen and act on issues and suggestions to improve the scheme” are aspects of the scheme that impressed sponsoring companies the most. Employers also stated that the sponsorship schemes are a real commitment to aligning course content to the needs of Industry. The schemes provide opportunities for networking and accessing diverse technologies and skills. One interviewee added:

“sponsored programmes are novel approaches to solving problems that exist and create more R&D projects. They are visible streams of talent, with fresh ideas who are generally very keen to learn, that can be nurtured even before they come into the business.”

6.7 The benefits of sponsorship to other parties

This section identifies employers’ perceptions of the benefits of sponsorship to students and university departments. The survey included two open-ended questions: “What
benefits do you think sponsored students gain from the sponsorship scheme?” and “What benefits do you think the Department gain from the sponsorship scheme?”

The research participants stated that sponsorship is an opportunity for students to gain experience of working on real projects and develop their skills. It also provides a financial contribution to students’ education costs and an opportunity for the sponsoring company to offer work during the sponsorship period and on graduation. These results agreed with student views as they identified “industrial experience”, “extra funding” and “job opportunities” as the main benefits of sponsorship to them.

The sponsors also expressed the views that sponsorship gives the students a better knowledge and clear insight of the industry, dispels preconceptions about work and is a good introduction to the businesses operating within the UK. In addition, employers believe that spending time with the company provides students with a better understanding of their courses, thus making them better students with better grades.

The sponsors see sponsorship as a way for departments to attract higher numbers of quality applicants on degree programmes and to enhance their marketing. Other opportunities for the departments include:

- establishing close links with industry which lead to a knowledge of industry needs and the development of courses which are aligned to these needs,
- getting support from industry to identify gaps and opportunities in technology, skills and training,
- creating job opportunity for their graduates, and
- enhancing reputation.

6.8 The relationship of industrial contacts with students and academics

Research participants were asked on a scale of 1 to 6 (1 = very poor, 6 = very good) how they rank their relationship with the sponsored students and university departments. All respondents rated their relationship with students as good (78%) or very good (22%).
“There is a good relationship and follow up between students and company and it will improve with time” said one senior manager, adding: “every company needs to improve their relationship with students and provide more and better mentoring rather than just providing sponsorship and leaving them alone.”

A clear understanding of the expectations of both parties from the outset of the sponsorship, and what both the companies and students are required to do is essential. It is important for students to know what they expect to gain and what companies expect them to do and know the required level of responsibility.

Employers also rank the relationship between university and industrial contacts as good (67%) or very good (33%) and depending on the willingness of individuals to maintain and improve the relationship. One interviewee suggested: “better understanding of how and why industry recruits would benefit academia in developing their links with industry.”

All the sponsoring companies believe their link with the university and students is a mutually beneficial relationship which works well and the reality of sponsorship meets their expectations. They therefore intend to continue their relation with the university. One employer added:

“good experience to date and it works well. Loughborough University is the leading University for construction related degrees and it has a strong reputation among students as the first choice University to study at. We have great students from there so why wouldn’t we continue?”

6.9 Students’ awareness of sponsorship

This section looks at the interviews and responses to an open-ended question within the survey which invited respondents to say what might be done to increase students’ awareness of sponsorship.

The employers stated that the university has to do more advertising on the website, at open days and in the prospectus to increase students’ awareness of sponsorship. The
university should develop an expectation amongst students that they should seek sponsorship and/or industrial placements, by direct promotion during University open days and lectures. It should be seen as essential that students link themselves to companies if they want to be competitive in the graduate job market. Companies could join the effort and put the information on their websites and brochures. Students should also find out about it themselves by linking with good career advisors. More advertising at schools and in national newspapers before they choose their universities could be very helpful. As Table 6-5 shows, students would have better understanding of sponsorship, if they were aware of it before coming to university.

Table 6-5: Crosstabulation of awareness of the scheme and understanding of the scheme

<table>
<thead>
<tr>
<th>Aware of the scheme before coming to university</th>
<th>Understanding of the scheme</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>Very unclear</td>
</tr>
<tr>
<td>0%</td>
<td>14%</td>
</tr>
<tr>
<td>Yes</td>
<td>0%</td>
</tr>
</tbody>
</table>

6.10 Improving the sponsorship schemes

This section looks at what the research participants felt might be done to develop the sponsorship schemes in the future. It draws on the interviews and responses to an open-ended question within the survey which invited respondents to say what changes, if any, they would like to see made to the schemes to ensure that all their expectations are met. The resulting findings can be summarized as follows:

- raising students’ awareness of their roles and responsibilities in industry,
- more employer liaison,
- more recruitment on the sponsored degree,
- more contact with students when they are at university,
- providing students with the opportunity to transfer to other consortium companies should they leave their sponsoring company,
• keeping the related information such as the number of students and consortium companies up to date,
• increasing the number of students applying for sponsorship,
• providing networking for students who are sponsored by the same company,
• more contact pre and post-placement with industrial contacts. Post-placement mentoring schemes for students back at university would be of benefit,
• the students need to be more proactive in contacting sponsors and not leave it to the industry liaison officers,
• visiting the students, whilst they are on placement, more frequently,
• early application process,
• the number of companies involved should not be limited and students should have a wider choice of companies, and
• having a formal review process for course content with industrial representatives.

The results from the student and employer studies reveal that there is still room for improving the level of communication between students and employers. It is important for both students and employers to build close relationships and keep effective lines of communication during the sponsorship period, especially when students are at university during academic semesters. The academic tutor can help with building the relationship by visiting students in their workplace at the early stage of their placement with the sponsor and making sure the students are settling in the company.

Another aspect of the scheme that needs to be improved is the number of students who apply for sponsorship. Some companies do not get the number they want and yet a relatively large number of students do not apply for sponsorship. The respondents also flagged the lack of recruitment on the sponsored degree programmes. They stated that easy access together with clear and encouraging information about sponsorship and its outcomes should be provided to students before coming to university which could generate more applications for sponsorship and increase enrolment for the sponsored degrees.
Another important issue is the application process timing. Late running applications schedules will lead companies to look for students somewhere else and students to apply for other available schemes. The results from the students’ surveys confirm that being already sponsored by other organizations is one of the main reasons for students not to apply for sponsorship run by their departments.

6.11 Employability of students

The employers were asked about the number of jobs that they had offered to the sponsored students in the 2006-2007 academic years. In some cases, the exact figure was not available but in general 75% to 100% of sponsored students received an offer and the majority of them accepted it.

In order to identify what the employers expect from new graduates, the participants were asked to rank on a scale of 1-6 (1 = Not important, 6 = Very important) how important each of the following is in offering job to a candidate: team working, personality, motivation, communication skills, creativity, academic performance of student, professional skills, and academic reputation of university.

As shown in Figure 6-5 behaviour factors are just as important as technical and theoretical factors. This highlights the importance of a long term relationship between students and industry as it could help the employers to monitor and choose their future employers and help students to prove their personalities and abilities to work in professional settings.

The research finds no significant difference between employers’ views in different engineering disciplines.
6.12 A Different perspective

This section continues to look at sponsorship schemes but this time from the particular perspective of employers within the construction industry who are not members of a sponsorship consortia but employ students for year out placement.

Six employers took part in this research. Two of these companies have been offering work placement to Loughborough students for more than four years. The number of places they offer to the students each year vary from two upwards. Three of the companies offer sponsorship to undergraduate students from other universities.

None of the participants have ever been involved in the Loughborough University sponsorship scheme. They stated that they would like to receive further information regarding the scheme, and they would consider becoming a part of the Loughborough sponsorship scheme in the future. One interviewee said:

“the market is competitive and market fights over graduates. Sponsorship made it far easier for both sides to have more understanding of each other, that's why we are so keen to be involved in the sponsorship scheme.”

Also, they stated that a long term relationship between students and industry during their study would improve the quality of graduate engineers and the university programmes.
Universities should be more pro-active in seeking improvements to their programmes by learning from the experiences of their students in industry.

They also agreed that sponsoring students would improve their graduate recruitment as the number of sponsored students is affecting the number of graduates available for employment for their companies.

They strongly agreed that providing industrial work placement is an opportunity to evaluate prospective employees, and they stated that sponsoring undergraduate students could be an even better opportunity to assess students at a very early stage of their careers.

Four of the participants said that they offer sponsorship to Loughborough students after work placement, and therefore guaranteeing the return of the students on graduation. In the past, they have offered jobs to more than 50% of students who completed work placements in their company.

The employers were asked on a scale of 1-6 (1 = Not at all, 6 = Considerably) how the following factors would influence their decision not to offer sponsorship: lack of information, company policy, university rules and conditions, resources commitment, time commitment, and overall cost. The results are illustrated in Figure 6-6, where they are presented in descending order of mean value.

![Figure 6-6: The main reasons for the employers not to offer sponsorship (Mean)](image-url)
As the results show the lack of awareness of the schemes and not knowing how they work and what they involve is the main reason for not offering sponsorship by the companies. It is also interesting to emphasise that the respondents stated that time commitment and cost has no significant impact on their involvement with sponsorship.

### 6.13 The current economic down turn

The recession has increased the challenges in finding jobs and has increased the importance of the right attributes for graduates to succeed in the labour market. Therefore, even in an economic downturn, more opportunities should be provided for students to engage themselves with employers during their studies and develop their employability skills (CBI, 2009c).

Coughlan (2009) cites the Organisation for Economic Co-operation and Development suggesting that:

> “the recession is a time to invest in skills, extra university places should be funded as a way out of recession and unemployment”(Coughlan, 2009).

Innovation, investing in recruitment, and developing high quality graduates are the potential key contributors to pulling the UK's economy out of recession. The investment is worthwhile and leads to success during the economic recovery period (Handley, 2009; Prior, 2009; The Royal Academy of Engineering, 2009; CBI, 2009c).

Richard Lambert, the director general of the CBI highlights:

> “the economic downturn makes cuts to public funding for HE inevitable, so new sources of funding have to be found. Universities and business must work together to preserve the quality of teaching and research, waste in the HE system must be cut, with universities sharing more of their services and consolidating to make efficiencies”(CBI, 2009a).

Furthermore, Sir Alan Langlands, Chief Executive of HEFCE, has said:
“These are testing times but higher education has benefited from very substantial growth over the past 10 years, and we should continue to aim for the very best within available resources. UK higher education generates nearly £60 billion for the economy with a multiplier effect of 3:1 from public investment. It clearly makes sense for the Government to take full account of this in setting priorities for the effective use of public funding in future spending rounds.” (HEFCE, 2010)

6.13.1 The effect of the down turn on sponsorship

In order to explore the impact of recession on the MEng sponsorship scheme, the reaction of construction companies who participated in this research was observed during the annual sponsors’ committee meeting. The current financial pressure has affected them and a number of employers have reduced the number of sponsorship offers. The number of students’ application for sponsorship was 36 in 2007-2008 and 28 of them offered sponsorship. The number of applications rose to 67 in 2008-2009 but only 23 offers have been made. It could have a negative impact on the future applications for the sponsorship as students may lose interest to apply. Therefore, it should be considered to attract other companies into the consortium, particularly if they can offer other dimensions to the placements and training on offer.

However, the employers agree that sponsorship is an investment in the future which puts them in a stronger position to meet the challenges once the pressures ease and that the current economic downturn will not have an immediate effect on them to stop offering sponsorship. Also, there are other companies who want to join the schemes to make sure their future workforces are highly trained.

In addition to the above meeting, four companies in the sponsoring consortium in the construction and mechanical industry were contacted in October 2009 to find out:

- Has the current economic downturn affected their company’s recruitment,
- How the current economic downturn has affected their company’s involvement in the sponsorship scheme(s),
What are the plans that companies and higher education institutions must consider to minimize the effects?

What are the post recession effects on the industry? and

What are the ways of supporting the industry post-recession?

All the companies stated that the downturn has affected their company’s recruitment. The effects are in forms of reducing the level of external recruitment, and also reducing student placements and graduate recruitment (in one case down to 10% of 2008 numbers).

Only one company’s involvement in the sponsorship scheme has been affected, and they will not offer any additional sponsorship in 2009 but will maintain their committed sponsorships. They stated that looking for additional sponsors and even Government assistance would minimize the effects on the schemes.

The other companies stated that the current economic downturn has not affected their involvement in sponsorship, and they will be recruiting at the same level as last year. Furthermore, one of the companies has been involved in major projects, and they have been able to provide graduate opportunities for students who have been sponsored by other members of the consortium.

It is obvious that some areas of the industry will be hit more heavily than the others if the recession continues. There still might be opportunities in the industry and students who are prepared to be flexible in terms of work type and work location will place themselves at a distinct advantage over their student colleagues. Anything that the company and the university can do to promote this mobility and flexibility would be welcomed.

The employers recognise the medium to long term problems in the recruitment pipeline which will impact the business in the post recession years, if they fail to continue to invest in the sponsored students.

The previous recession caused a large number of skilled people to leave the industry (Construction News, 2009). Therefore, it is important that graduates continue to enter the
businesses otherwise industry will suffer a major skill shortage again. Therefore, the consortium should pull together and if it can demonstrate that its members act in the best interests of students then it will add greatly to the credibility of the programmes, the university and the consortium.

A survey in October 2009 was carried out with the final year sponsored students in the Civil and Building Engineering department in Loughborough University (n=43). In order to monitor the sponsored students’ success in finding employment in the period of the downturn when competition for jobs is more intense, the students were asked if they had received a permanent job offer. At the time of the survey, 43% of them had received an offer at the beginning of their final year. This is lower than 79% in 2007 and 71% in 2008 but still shows the employers’ effort to commit to the scheme and also keep their valuable work forces.

One way the university can support the industry and its students is to involve more companies in the schemes and not just a handful of well known companies. Companies need to have access to a vast pool of universities and as the CBI has reported, considerable commitments have already been made by employers regarding to maintaining graduate recruitment through the downturn (CBI, 2009c). These include:

- encouraging more links with universities,
- extending collaboration with universities on workforce development,
- increasing placements and sponsorship opportunities, and
- enhancing graduate programmes.

### 6.14 Summary

All responding companies indicated that a long term relationship with students and university has mutual benefits for industry and engineering education. The benefits are in the form of access to high calibre students and a reflection of industry’s needs in the degree programmes in order to produce graduates with the ability to face the real world problems. The respondents confirmed that sponsorship has an important impact on their recruitment and the supply of motivated graduates for the industry in general. Also,
companies who do not offer sponsorship stated that they are aware of the benefits of sponsorship and they would like to join the schemes in the future. The quality of university’s degree programmes and the quality of its graduates encourage companies to sponsor degree programmes. Generating more applications for sponsorship and keeping effective lines of communication between the parties during the sponsorship period would improve the existing schemes. There is no significant difference between the different engineering disciplines, which suggests a consistent industry view on sponsorship.

The sponsorship schemes provide the opportunities for employers to be involved in the teaching and training of students, inform universities of their skill requirements and influence the curriculum. The sponsored courses are therefore more aligned to the needs of industry and this improves student employability.

The employers see sponsoring students as a way of maintaining training and as a mean to continue developing the skills of their workforce to make sure that skills are not lost in the industry during the recession. The employers recognize the need for more investment in skills in order to make sure industry comes out stronger after the recession. However, there are challenges and uncertainty in industry. For example, in the construction industry new orders dropped 25% in the final quarter of 2008 compared to that of 2007 which caused job losses in the sector (Prior, 2009). Therefore, investing more in the training of the future employees remains a challenge for a number of companies.

Expanding the sponsorship schemes and even seeking Government assistance are plans that companies and higher education institutions might consider to minimize the effect of the recession.

When recruitment increases, the employers will need access to highly qualified graduates in order to survive. Therefore, making sure that the industry will not lose qualified graduates permanently is the best way of supporting industry post-recession. The profile and standard of applications to the sponsored programme must be increased and the sponsoring companies should remain as committed as possible to the scheme.
Chapter 7: Discussion

There has been considerable debate in the UK on the need for greater interaction between industry and universities, and it is a requirement of accreditation by professional bodies for industry input into the curriculum. Without any doubt, the university-industry link has received noticeable attention and is seen as a priority. It is an accepted belief that exposing students to contact with industry either within the taught elements of their programmes or on work placements enhances student learning (Lambert, 2003; Leitch, 2006; Lord Sainsbury, 2007; The Royal Academy of Engineering, 2007).

This research has investigated how sponsorship closes the U-I gap and facilitates U-I engagement. It has explored the role of sponsorship in increasing the benefits and adding value to the education of undergraduate engineering students. The views of students, academic staff and industry experts have been gathered through a combination of interviews, questionnaire surveys and use of existing data.

This final chapter provides answers to the undermentioned research questions following the analysis of data obtained between March 2007 and October 2009 from the parties involved, as well as the relevant literature reviewed and local experiences of working with employers in Loughborough University:

- What are the incentives for these stakeholders?
- What are the benefits derived from sponsorship by students, academics and industry?
- What impact does sponsorship have on student employability?
- What is the role of sponsorship in building a relationship between students and their future employers?
- Does industrial sponsorship influence the learning outcomes of degree programmes?
- Is there a link between influence on the curriculum, programme quality and student employability?
• What are the factors that limit the sponsorship schemes?

The chapter continues by comparing sponsorship with other links between students and employers. Guidelines for effective industry collaboration are proposed and a model of practice is presented based on students, academia and employers’ expectations, together with criteria which could be used as guidelines for dissemination of sponsorship in the engineering fields.

7.1 What are the incentives for the stakeholders?

The UK is facing a shortage of high quality engineering graduates and a need has been identified to improve partnerships between universities and employers to ensure the curricula are developed through a consideration of the needs of industry. The partnerships will help to develop undergraduates’ programmes and provide students with experience of real-life industrial engineering challenges (The Royal Academy of Engineering, 2007; BIS, 2009).

The research has investigated the parties’ view about the role of sponsorship in building such partnerships and Figure 7-1 presents the important factors that encourage them to get involved in sponsorship.

The results show the research participants see sponsorship as an effective interaction between industry and university engineering departments to attract more students into engineering. It provides students with the opportunity to gain industrial experience and extra training. Therefore, they are better qualified to face the challenges of the fast changing world of work on graduation. Sponsorship gives employers access to highly trained graduates which helps them remain competitive in the growing business world. The results also show that the sponsored programmes help to build close links between the parties and develop courses in line with the real and constantly developing requirements of industry. As the results suggest, sponsorship enables employers to influence the course design in terms of knowledge and skills in order to improve the relevance of these courses to their needs.
Figure 7-1: The parties’ incentives to be involved in sponsorship

Sponsorship also makes engineering careers more attractive to students, as more sponsored students than non-sponsored students stated that they will take up engineering after graduation. These results are in line with the Roberts Review (2002), SET for Success, which identified that industry involvement makes courses more attractive and relevant to both students and employers. The results are also reinforced by The Higher Education Academy Engineering Subject Centre - Employability Guide- that degree programmes must provide students with the necessary theoretical and practical training:

“Engineering is not just applied science and mathematics. Nor is it merely applied technology. Rather, engineering is about the application of the understanding, knowledge, skills and know-how (as appropriate) of scientific, mathematical and technological principles in a business context to achieve an economic solution” (Higher Education Academy Engineering Subject Centre, 2005).

As the results show, the parties involved agreed that sponsorship provides students with a variety of experiences and professional skills to work effectively in industry.
7.2 What are the benefits derived from sponsorship by the stakeholders?

All the parties involved in the schemes (sponsored students, academic staff and sponsoring companies) were independently surveyed and asked to identify the benefits of sponsorship for themselves as well as the benefits to the other groups. The perceptions of each group for the benefits of the scheme can be summarized in Figure 7-2.

<table>
<thead>
<tr>
<th>Students perception</th>
<th>Academia perception</th>
<th>Employers perception</th>
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</thead>
<tbody>
<tr>
<td><strong>Students benefits</strong></td>
<td><strong>Academia benefits</strong></td>
<td><strong>Employers benefits</strong></td>
</tr>
<tr>
<td>Industrial experience</td>
<td>Job opportunity for graduates</td>
<td>Enhanced recruitment</td>
</tr>
<tr>
<td>Future job</td>
<td>Link to industry</td>
<td>Access to talented students</td>
</tr>
<tr>
<td>Extra funding</td>
<td>Enhanced reputation</td>
<td>Access to talented students</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Enhanced recruitment</td>
</tr>
</tbody>
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Figure 7-2: The parties’ benefits from sponsorship from the different perceptions

The results show that the parties taking part agreed that sponsorship has a positive impact on them and there is a considerable uniformity overall in their views.

Sponsorship gives students direct access to industry and an opportunity to apply work in a real world context. These factors could have an important effect on student employability as the majority of companies see industrial experience as an important discriminator in selecting job applicants for interview. One student mentioned:

“It builds your confidence about your abilities in the sector. It gives you a head start and you feel in a better position to achieve than everyone else.”

It also provides an appreciation of real world issues, an introduction to professional working protocols, a better understanding of their course material and gives students a chance to see if their chosen career/employment is a good fit for them. One civil engineering student stated:
**“I probably learned more of relevance during my sandwich year than my whole academic years.”** Adding: “it [sponsorship] offers extra support and the industrial placements are real experience of what working as a civil engineer involves. Even if you were not keen on the type of company (a contractor) as I was, at least I knew that consulting was what I wanted to do.”

Sponsorship is also a commitment from the sponsorship company to offer work during the summers and placements and most likely a job on graduation.

The Roberts Review revealed concerns over science and engineering students’ finance (Roberts, 2002). The longer scheduled hours of study on these courses inhibit students in taking part-time work to support themselves through university. Sponsorship is a massive financial benefit which allows students to fund their degree and afford related activities and equipment to enhance their study. One said:

> “Great scheme - financially I would have possibly not been able to complete all 4 years in a row without the money. It allowed me to enjoy my university life without financial worries”.

There is a growth in demand for graduate engineers but the supply of engineers is not increasing quickly. The recent study (Bowen, Prior, Lloyd, Thomas, & Newman-Ford, 2007) stated that 95% of engineering firms have found it difficult to recruit graduate level engineers and also that the skills’ shortages have a negative effect on their business. As the results show (Figure 7-3) all parties agreed that the sponsorship schemes are a step forward in increasing the quality and quantity of engineering graduates. Sponsorship increases the supply of graduates, who have technical, practical, and communication skills and the ability to apply theoretical knowledge to real industrial problems. It could be an answer to meeting the increasing demand of graduate level engineers by industry.

Sponsorship also creates a link with companies which enhances the reputation of the department and the university and may eventually lead to more students applying to study engineering. Sponsorship schemes are real commitments to aligning courses to the needs of industry and provide ideas for developing the curriculum. They allow networking and
supply funding opportunities to develop other activities and research projects in the future.

The principal benefits of the schemes for the employers are an interaction with university at undergraduate level and close contact with students early on in their development. These provide a better understanding of the current problems in terms of the number of engineering graduates suitable for recruitment and a longer term assessment of students. The employers have 4 years to assess the candidates before offering employment and this helps them to get an individual who understands theirs company’s processes and ethos. The employers get students acquainted with their industry who have a long term career commitment. It is therefore a cost effective recruitment method for their companies. Students come with fresh ideas and are generally very keen to learn and add value to the company they work in. Sponsorship also has networking benefits and it increases the companies’ publicity and reputation within the university and with students.

Overall, students, academics and employers who took part in this research stated they have built up a good relationship through the sponsorship schemes which have benefited them all. As the results show (Figure 7-3), what the parties gained from sponsorship are closely in line with what they expected to gain, which could suggest that the reality of sponsorship meets their expectations.

<table>
<thead>
<tr>
<th>Expectations</th>
<th>Students view</th>
<th>Academia view</th>
<th>Employers view</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gaining industrial experience</td>
<td>Supplying sufficient good quality graduates</td>
<td>Employment of enough well trained graduates</td>
</tr>
<tr>
<td></td>
<td>Gaining extra training</td>
<td>Aligning their course contents with companies' requirements</td>
<td>Providing engineers for industry in the future</td>
</tr>
<tr>
<td></td>
<td>Securing future career</td>
<td>Building links with industry</td>
<td>Influencing on teaching and training of students</td>
</tr>
<tr>
<td>Achievements</td>
<td>Industrial experience</td>
<td>Enhanced marketing</td>
<td>Enhanced recruitment &amp; reputation</td>
</tr>
<tr>
<td></td>
<td>Future job</td>
<td>creating job/training opportunities for their students</td>
<td>Access to young and talented students</td>
</tr>
<tr>
<td></td>
<td>Extra funding</td>
<td>link to industry</td>
<td>Input in the students’ education</td>
</tr>
</tbody>
</table>

Figure 7-3: The parties’ expectations vs. their achievements
7.3 Sponsorship support of employability skills

Lack of communication, team-working and interpersonal skills are common weaknesses in graduates (Spinks, Silburn, & Birchall, 2006). They have technical and theoretical knowledge but some of them are not professionals. One of the employers said:

“What we are looking for is not someone who gets 85% on the exam paper. The ability to work and communicate with other people is what we are looking for. A number of them [graduates] cannot manage people or put a report together or go to meetings. Sponsorship provides them the opportunity to learn these skills in the company over the years.”

This section explores the role of sponsorship on preparing students for the workplace. The employers and academic staff agreed that continuing links between students and employers give the students a better understanding of their future careers as engineers and a better knowledge of the commercial implication of engineering decisions. It also makes them more productive and makes a significant contribution to developing their professional skills such as communication and team-working.

Figure 7-4 presents the important factors that employers consider when offering a job to a candidate and Figure 7-5 shows the students’ perception of how sponsorship contributes to the development of some of their programmes’ learning outcomes linked to these factors.

As Figure 7-5 shows, sponsorship has a positive effect on team working, communication and other professional skills, as sought by employers. This conclusion is supported by the survey’s results, which showed that 75% of the final year sponsored students had received a permanent job offer compared with 41% of non-sponsored final year students. It should be noted that the majority of students, including non-sponsored students, do a placement during their studies. This result would therefore suggest that sponsorship has a positive effect on students’ employability compared with placement programmes.

Employability of the sponsored students could have a considerable impact on the attractiveness of sponsored programmes and encourage future students to apply for
sponsorship. As degree programmes would attract more applications, if they offer a strong chance of employment upon graduation (Robinson, Bramhall, & Rowe, 2007).

![Diagram](Image)

**Figure 7-4: The importance of different factors affecting on employers’ decision in offering job (Mean)**

(1= Not important 6=Very important)

**Figure 7-5: Students perception of sponsorship support of selected learning outcomes (Mean)**

These findings are in line with the findings from the CBI report (CBI, 2009b), which revealed employers strongly value employability skills and positive attitudes. Students
and universities should be aware of the importance of these skills, which make graduates more employable after graduation.

7.4 Sponsorship support of students learning

The learning cycle suggests that it is not sufficient to have an experience in order to learn. It is necessary to reflect on the experience to make conclusions and formulate concepts which can then be applied to new situations. This learning must then be tested out in new situations. The learner must make the link between the theory and action by planning, acting out, reflecting and relating it back to the theory (Kolb and Kolb, 2010).

The sponsorship schemes facilitate students learning by enabling them to learn from their experiences. During sponsorship, students take activities which include the four phases of Kolb's experiential learning cycle so that students would engage in a continual cycle of experiencing, examining, explaining, and applying.

For the concrete experience phase, students collect the information needed for their projects via fieldwork. For the next phase of Kolb's model, reflective observation, students organize and examine their collected data to make initial speculations on the direction their projects need to take. Next, for the abstract conceptualization phase, students shared and discussed their findings in a threaded discussion forum where they considered how their findings will inform their design decisions, what additional information they need to collect, and how they will collect information that is difficult to gather. Finally, students take their findings and compile them into a formal project proposal, which completes the front-end analysis with an active experimentation activity.

This suggests that sponsorship could play an important role within the Kolb learning cycle, allowing students to reflect on their experiences and use feedback from others to process their ideas, take ownership of them and integrate their new ideas into future assignments.
7.5 Barriers which limit involvement in sponsorship

All the parties involved in the schemes, sponsored students and recent graduates, academic staff and sponsoring companies, were independently surveyed and asked to identify the barriers which prevent their involvement in the sponsorship schemes (Figure 7-6).

- **Students**
  - Already sponsored
  - Lack of information
  - Commitment after graduation

- **Academia**
  - Lack of interest from employers
  - Time and staff commitment

- **Employers**
  - Lack of information
  - Time and staff commitment
  - Cost

Perception of an onerous continuing commitment to the sponsor following graduation and a lack of awareness and information about sponsorship are reasons for the students not to apply for sponsorship when it is offered. The results also show that a number of the students who did not apply for the scheme run by their department are already sponsored by other organizations. This may be due to poor timing of the application process.

The research has also revealed concern amongst academics about the staff and time commitment needed to introduce and operate new schemes. In addition to this issue, there is a lack of interest from a number of employers in some of the engineering disciplines to be involved in sponsorship. It highlights the importance of facilitating
university-industry relations, which could increase the interest and demand from employers.

“Cost” and “staff and time commitment” are identified by the academia as one of the barriers which stop companies offering more sponsorship. However, employers stated the lack of information about what is happening in a university and what the university offers is the main reason for not offering sponsorship.

Industry therefore needs to be alerted about the benefits of sponsorship as this can be a starting point for a successful partnership and could promote demand from employers. As the results show, all the companies who are not a member of the sponsorship schemes but offer placements to students stated that if they have information and details about the schemes, they would like to join the consortium.

### 7.6 Sponsorship vs Placement

Having a degree alone in today’s job market is not enough for a graduate; employability skills are as important as technical and theoretical skills. Employers significantly value graduates with the right skills, qualities and attitudes. They seek employees who have a range of professional skills not only to show initiative and apply their knowledge in practice but also progress within the company and contribute successfully to the company (Jones, 2004).

#### 7.6.1 Time matters

Universities adopt a range of methods for embedding skill development within the undergraduate programmes (Robinson, Bramhall, & Rowe, 2007). Linking students with employers during their degree study is an ideal way to build up a strong variety of skills. This “link” could be in a form of a 3 to 12 month placement, vacation job or four years of sponsorship support. However, the longer term relationship gives more responsibility to students and more growth in their personal development (Foley, 2004; Little and Harvey, 2006). In addition, getting a meaningful understanding of any new situation takes time. Undertaking short term placements could lead to difficulties in understanding the relationships and problems of dealing with too much information in a compact time scale.
(Baxendale and Hook, 1992). A previous study by Alan Gordon et al. (1985b) acknowledged that the most successful engineering courses were those that were operated by university departments in cooperation with employers. It stated that these courses suit the needs of students and requirements of employers.

Longer term links give students a long period of time to learn from and contribute positively to their sponsoring companies. It usually takes time to supervise and train students and only long term relationships let the sponsors recover the cost of supervision and training (Ahmed, 2009).

This view is also supported by the results presented in Chapter 6 and show that companies who sponsor students for a longer period are more likely to benefit from sponsorship than the companies who just sponsor students for one year or less.

### 7.6.2 Financial matters

A recent survey showed that over 80% of potential students worried about the debts they build up while at university (Universities UK, 2002). Receiving financial support from sponsors could therefore help students pay their debts and afford related activities and equipment to enhance their degree programme. One Civil Engineering student said:

> “the financial support has made all the difference. I imagine the £3000 top up fees today will be a lot more in the future. Since all decent universities Civil Engineering degrees are 4 years now, doing Civil Engineering is £3000+ more expensive than many other degrees, for students who are financially constrained, and the sponsorship scheme could really help with this.”

### 7.6.3 Distinctive benefits from the student perception

The survey of the sponsored and non-sponsored students on the same course provided information on their differing views and in particular, the perceived benefits associated with sponsorship.

The results from the survey of 57 final year MEng students in Civil Engineering at Loughborough University who were not in the sponsorship scheme, but of whom the
majority had been on a 12 month placement, showed that over 87% of them believed that they could have benefited from a four year sponsorship programme. They said they would recommend the scheme to other students. They anticipated benefits could be in the form of gaining extra funding, more work experience, future employability, links to industry, better insight of future career, better understanding of academic work, and consistent training (Figure 7-7). This means that sponsorship gives all the benefits of placement plus more. One of the students said: “I think it was a missed opportunity for me and that all benefits would have been great”.

![Figure 7-7: Long term relation through sponsorship is a superset of placement](image)

In addition, the results from the graduate study and survey of the students who had recently completed the sandwich year placement in industry (4.16 and 4.17) indicate that 98% of the respondents stated the sponsored degree with sandwich placement will offer the most benefits to the students.

Also, in this study, documentary analysis was applied to the degree results to find out if there is any difference between the sponsored and non-sponsored student academic performance. The module results and degree classifications of the sponsored students in MEng in Civil Engineering (n=33) were compared with the results of the non sponsored students in the same programme (n=12) for the academic years 2006-2007 and 2007-2008. The results (Table 7-1) show that sponsorship has an impact on the students’ performance and that the sponsored students finish their degrees with better grades and higher classifications. It should be noted that not all the good students apply for sponsorship. One respondent commented:
“Spending time in the company gave me the ability to appreciate the construction process in much more detail upon my return to university and gain much needed site experience and an improved work ethic which resulted in a higher grade than the grades achieved previously.”

Table 7-1: Comparison of the examination results of Civil Engineering students

<table>
<thead>
<tr>
<th></th>
<th>1st</th>
<th>2:1</th>
<th>2:2</th>
<th>Average mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sponsored students</td>
<td>33%</td>
<td>64%</td>
<td>3%</td>
<td>69</td>
</tr>
<tr>
<td>Non-sponsored students</td>
<td>25%</td>
<td>66%</td>
<td>8%</td>
<td>65</td>
</tr>
</tbody>
</table>

However, there are other factors which need to be taken into consideration as the sample size was small. Therefore, further research is required to find out if sponsorship leads to better results or the better students get sponsorship.

7.6.4 Distinctive benefits from the employer perception

The world of work in all employment sectors or career areas is changing rapidly. Students therefore have to learn to cope with the uncertainty that goes with the changes (Gilleard, 2004). Sponsorship provides continuous training and learning throughout the degree studies over the four/five years and this could maintain the employability of students. More than 85% of sponsoring companies stated that the sponsored graduates have better knowledge of the related engineering discipline and a greater ability to apply theory in practice in comparison with placement and non-sponsored graduates. They always prefer an engineer who has spent a reasonable period of time working in industry during their studies. One added:

“We have a strong preference for sponsorship routes as this allows us to form a longer relationship with the student than sandwich placements alone.”

Also, 88% of employers see sponsorship as a way to be involved in teaching and training of students and they agree that the sponsored programmes develop in line with their requirements.
In addition, the UK’s SMEs invest around £300 million a year in hiring 250,000 employees. Statistics show that 22% of new employees leave the company soon after joining and this costs the companies £69 million (The Wellingtone Project Management Newsletter, 2009). Sponsorship provides a fast-track recruitment method. Seventy five percent of sponsored students have received an offer, whereas only 41% of placements students have received an offer (these results are from students in the second semester of the final year of their degree). The sponsorship of students also helps companies to establish an early relationship with key future employees and allows both the student and the sponsor to have practical experience of working arrangements over three or more years before either makes a full commitment. Eighty five percent of companies stated that sponsored students stay longer with the company. One interviewee said:

“If we have sponsored them, we are more aware of their skills and knowledge and therefore know from the outset that we are making the right decision.”

On the other hand, sponsored programmes are a suitable long term assessment method of the student quality. One employer said:

“As sponsored students, we have the opportunity to support and aid the development of the individual over the sponsorship period by work based opportunities and technical training during work placements. This gives us a longer assessment period to strengthen the individual’s ability so they can complete their studies and secure a quality degree, which is what we are looking for as an employer.”

This result suggests that sponsorship is a way to counter one of the main issues regarding graduate quality. This is the perception that paper qualifications are not a true indicator of quality and appropriate skill levels, since there is a feeling amongst some industry practitioners about inflation of grades in recent years (Spinks, Silburn, & Birchall, 2006).

Another aspect of the results from the survey of the companies who employ Loughborough University students for a year out placement, but who do not offer sponsorship, revealed their concerns over the competitive job market. They agree the
number of sponsored students is affecting the number of graduates available for employment for other companies and that non-sponsoring employers could face increased recruitment difficulties in particular areas.

They mentioned spending time in industry is a great opportunity for students and is a good recruitment opportunity for the company. They are very keen to improve their relation with university and they would consider becoming a part of the Loughborough sponsorship scheme in the future.

7.6.5 Distinctive benefits from the academia perception

The respondents from the departments with no sponsored programmes stated that linking students with employers throughout their degree studies would have considerable benefits for the department. These links through sponsorship create job and training opportunities for the students and provide ideas for improving degree programmes in line with the employers’ needs. They agreed that sponsored programmes would noticeably improve the quality of graduate engineers and university programmes. Figure 7-8 presents the results in descending order of mean value.

Furthermore, sponsorship increases the department and university reputation and improves the department’s graduate recruitment. This has a positive effect on marketing and attracts more students to the programmes as, in the last few years, it has become even more important to students that they are able to get employment upon graduation (Robinson, Bramhall, & Rowe, 2007).

In addition, academic staff believe the schemes will develop the contact between the students and employers, which will give them more responsibility and a chance to improve their self development capability.
The recent studies (Lord Sainsbury, 2007; etb, 2007) revealed that a number of engineering graduates have little desire to take up an engineering career and the American Society for Engineering Education newsletter (ASEE, 2009) reported “over 85% of students not considering engineering careers”. Many students perceive that the theoretical content of the degree programmes do not have much relevance to real life problems and for that reason they drop from the engineering programmes (Szabo & Karacal, 2009).

However, the student survey results showed the majority of the sponsored students will not move out of engineering (section 4.15). It suggests that the sponsorship schemes could bring in the applied and interesting part of the engineering profession and in consequence could contribute to student retention.

### 7.7 Guidelines to overcome the barriers

This section brings together views from the students, academic staff and employers about what changes need to be made and how they might be brought about in developing the sponsorship schemes to ensure that the benefits derived from the schemes are maximised in the future.
• Giving the sponsored courses high profile. While departments provide lots of information about sponsorship, a significant number of students perceive that there is a lack of information. Therefore, the related information should be made more accessible and easier to find.

• Providing more information to the parties to ensure that they understand the needs, roles and expectations of each other. These needs should be reflected in the schemes’ design. This could encourage more students to apply for sponsorship and develop both employers and academia engagement in the sponsorship schemes.

• Meeting with students prior to accepting the offer to put everyone’s expectations on the table and clear up the issues on both sides. Post-placement mentoring schemes for students back at university would be of benefit to assess the achievements and plan for the future.

• Giving the students the option to change companies in the consortium to allow them to undertake different projects in different areas within the industry.

• Keeping the scheme process simple and transparent. The administration issues should be facilitated to minimise the time and staff commitment required from both the department and the employer in order to avoid all miscommunications. For example, constantly changing the person who is dealing with the sponsorship issues and not informing the other parties will result in enormous delays. All the information regarding to the contact details in the department and the company should therefore be kept updated.

• Minimising changes of the HR and technical staff of the sponsoring companies. It is important that any company representatives new to the consortium are fully informed about the recruitment process and the support that is expected from/to the consortium members.

• Involving small to medium size companies, especially if they offer different training and placements to the students. Although the participating companies’ links with universities are very effective, they are limited to larger companies and cover particular business needs.

• Boosting the employers’ interest to be involved in sponsorship by:
  • attracting high quality students and supplying good quality engineers,
• improving the structure of courses to make them relevant to the business and attractive to potential students,
• providing them with early access to the good quality students,
• providing them with information regarding the successful schemes and case studies,
• involving the industrial representatives in the regular review of the course content, and
• developing external relationships and institution affiliations.

• Considering the right time for running the application process as time is limited for the students and employers.
• Evaluating the schemes to assess their success in achieving their expected objectives and generate feedback on their performances.
Chapter 8: Conclusions and Recommendations for future work

Each of the chapters reporting the research findings has concluded with a summary of key points. This chapter aims to provide a combination of the findings from the different stakeholders’ perspectives. At the end, it presents a model of practice which has been developed based on the views and experiences of the parties involved in this research.

Amongst the most important findings of this study were the close views of the students, industry and the academic staff on the sponsoring of undergraduate engineering students. Also there was no significant difference according to demographic factors such as different engineering disciplines or industry sectors.

All the parties indicate that sponsorship is a way forward in the link between university and industry and has mutual benefits for both industry and engineering education. The parties agreed on the positive role of sponsorship in improving the number of engineering students and filling the skill gaps in the education of engineering students. Sponsorship minimises the mismatch between the needs of industry and the undergraduate programmes and makes it easier for employers to engage with the university department at the teaching and learning level in order to discuss their skill requirements.

While research shows that all the stakeholders agree that sponsorship is a good practice and the results provide a high degree of ‘consensual validation’ about the usefulness of sponsorship, it is not scientifically objective. However, the high degree of inter-subjective agreement provided by the results is as close as one can get to ‘objectivity’ in this field.

Student, academic staff and the employers’ incentives to be engaged with the sponsorship schemes are gaining industrial experience and long term training, obtaining input from
industry, creating training opportunities for the students, recruiting enough well trained graduates, and supplying the future engineers.

8.1 Benefits of sponsorship

Ninety-four percent of the students who participated in this research agreed that they have benefited from sponsorship. They said the realities of sponsorship matched with their expectations and they encourage other students to apply for sponsorship.

Students in the sponsored degree also rated industrial experience, practical skills and extra training as more important than the students in a partly sponsored programme. This could suggest that the students see the sponsored programmes as more effective ways of gaining these skills.

Sponsorship provides continuous training and learning throughout the degree studies over a four/five year period and this helps the students to learn how to cope with the uncertainty that goes with the changes in all employment sectors. The results have revealed that longer term (>one year) links are more beneficial than short periods of contact. The students who were not in the sponsorship scheme, but had been on a 12 months placement, stated that the sponsorship programmes would have been beneficial and all of them recommend the scheme to other students.

Sponsorship as a long term relationship gives the students more responsibility and the ability to contribute positively to their sponsoring companies, and allows the sponsors to recover the cost of supervision and training.

All the parties agreed that sponsorship provides more experience in the application of theoretical understanding. Most students often get access to real world problems late in their studies (usually after their third year, if at all,) but the schemes provide students early access to the application of what they study at university. The schemes also provide students with opportunities for reflection, practice, and experimentation.

The students cited that sponsorship is a superb method gaining an understanding of what is learnt and how it is applied to real life situations. The students agreed that their link to
a sponsor has had a major impact on the development of those programmes learning outcomes which are linked to employability skills. They scored the time that they have spent in the sponsoring companies as an invaluable opportunity to gain a range of knowledge and skills to work effectively in industry. They consider this has made them more "marketable" for the future. They expressed the views that the knowledge and experience gained during their sponsored degree set them apart from other graduates and the other new intake into the company who were only just starting work after a full time degree. One student said: “A network of colleagues and a wealth of experienced above those non-sponsored graduates!”

Sponsorship greatly helps the students to communicate with people at all levels and build up strong links with their future employers. This allows both the student and the sponsor to have practical experience of working together over three or more years before either makes a full commitment. It is also very important in today’s job market, where having a degree alone is not enough for a graduate, and employability skills are as important as practical and theoretical skills. Furthermore, the universities and companies featured in this research all stated that industrial input to the programmes improves student employability skills. The majority of the employers believe that the sponsored programmes generate high quality graduates who are well worth employing on graduation. Over 75% of the sponsored students have received a permanent job offer either from their sponsoring company or from other companies. More than 65% of them said that they would accept the job offer.

There is huge competition in the market for bright graduates and this research illustrates that the number of sponsored students is affecting the number of graduates available for employment by other companies. Non-sponsoring employers could face increased recruitment difficulties in particular areas.

It also suggests that being sponsored by a company helps students to know the company and gain a better idea in terms of their job after graduation. This allows them to make a more informed career decision. One student said: “this [the sponsorship scheme] made finding the right company much easier than if I had to arrange everything myself.”
Furthermore, the results show that 91% of the sponsored students said they will take employment in engineering and do not intend to move out engineering.

In addition to the above benefits, sponsorship offers financial support which greatly helps with the cost of students’ education and in many cases helps them to afford related activities to enhance the degree programme. Since most of the engineering degrees are four years now, it makes these courses more expensive than many other degrees and sponsorship schemes could really help with the student finances.

Through the sponsored programmes, departments build links with industry. They also get input from industry to identify skill gaps in their graduates and provide opportunities in new technologies which would noticeably improve the quality of the graduate engineers and the university programme. Sponsorship enhances the department’s reputation and the high profile direct link with industry has a positive impact on the departments’ ability to attract good quality applicants to the programmes. It also creates job and training opportunities for their students and supplies sufficient good quality graduates who suited the industry.

The sponsorship schemes provide opportunities for employers to be involved in teaching and training of students and influence the curriculum. The sponsorship schemes are real commitments to the alignment of courses to the needs of industry. The degree courses or modules that had been jointly developed between industry and university are examples of best practice in education of the undergraduate students. These courses could be a solution to the problem of skill shortages and the lack of appropriately qualified graduates available for recruitment. All the participants firms are very pleased with their collaboration with the university and intend to continue their partnership.

The results also show that the companies who employ Loughborough University students for year out placement, but do not offer sponsorship, also found sponsorship attractive, and they would consider becoming a part of Loughborough sponsorship schemes in the future.
The results also provided confirmation of the enthusiasm of the construction industry for closer collaborative links with University. It has to be made clear to other engineering firms what the sponsorship schemes offer and make them aware of the substantial benefits.

Sponsorship guarantees the recruitment of enough graduates of a suitable quality with more knowledge and experience of the company and industry than others. Furthermore, sponsorship is a cost effective and time effective recruiting process. The results highlight the importance of the long term relationship between students and industry and how sponsorship could help the employer to monitor the students over years. It is an extended interview period which provides the employers an ideal opportunity to assess the candidates and choose their future employees. The majority of companies stated that they prefer to recruit sponsored graduates rather than direct entrant engineering graduates.

Monitoring the sponsored students’ success in a period of economic downturn showed that they are still doing well when there is greater competition for jobs.

The students have fresh ideas and are encouraging and challenging other engineers which adds value to the workplace. It should be mentioned that the students have also been positive about the employers’ support, which shows the industry does care about encouraging fresh graduates coming to the sector.

The values that sponsorship adds to the education of the undergraduate students could be summarised as follows:

- setting up dynamic and long-term relationships with university engineering departments,
- building educational links with industry,
- improving degree programmes and quality of engineering graduates by considering the skills required by industry,
- ensuring that courses attract a sufficient number of students and produce graduates with a high level of relevant technical capability, with the ability to apply it.
All these values are in line with the requirements for student-university-employer links requested by the government and expert reports (Lambert, 2003; Leitch, 2006; Lord Sainsbury, 2007; The Royal Academy of Engineering, 2007).

8.2 Disadvantages and recommendations for improvement

Lack of information about what is involved in the schemes and the level of a party’s commitment could lead to a lack of interest in involvement in sponsorship. In the majority of sponsorship cases there is no rule for the students’ commitment to their sponsoring companies but they might not receive further funding if they do not agree to stay with the company. However, the perception of being faced with having to stay with the sponsor stops a number of students for applying for the scheme. There are worries among the students concerning early commitment to one company and how long this ties them in for when they are still deciding what to do/achieve in their career.

On the other hand, recent graduates believe that the commitment to the sponsor is a good opportunity of employment which gives peace of mind that the sponsored students will have a job on graduation. Therefore they suggested that students should be made aware of the benefits of the funding support, experience, and a possible job on graduation. Prior to applying for sponsorship students should be provided with clear and detailed information about any binding terms and conditions.

Providing clear and accessible information, continuous follow up and feedback on the performance of the schemes are the main elements of successful and sustainable schemes. The information must be provided about schemes to both the companies and the students in order to:

- widen the parties’ views,
- develop both employer and student engagement in the sponsorship schemes,
- raise the employers’ interest to offer sponsorship, and
- encourage more students to apply for sponsorship.

There is also a need for employers and department to evaluate their sponsorship schemes in order to identify how successful the schemes are in helping them to achieve their
objectives, and students to acquire employability skills. The evaluation provides evidence and feedback about schemes that allows decisions to be made.

Another disadvantage of the schemes is the lack of opportunities for students to gain experience in a wider range of fields. The sponsorship awards should be partnered with the consortium rather than a single company. In this case, students will have the opportunity to carry out placements at two or more companies in the consortium rather than feeling being "tied" to one company. It will allow them to gain more experience in different areas and help them to make an easier decision regarding their future career.

Making the students aware about the sponsorship schemes run by the department before choosing their course and before arranging any other sponsorship is another important point in developing the schemes. It could generate more applications for sponsorship.

The students’ awareness of the benefits that accrue from sandwich training and financial aid availability has to be increased. They need to be educated on the value of gaining a technical skill as an essential building block for subsequent progression into the profession. An expectation that students should be sponsored and/or go on industrial placements needs to be developed. More universities should go down the sponsorship route and encourage their students to apply for it, if they want to be competitive in the graduate job market.

Advertising at universities and in industry publications, linking the scheme more closely to recruitment programmes, promoting during lectures will all encourage the students’ engagement with sponsorship.

The sponsorship schemes need to be more interactive and the students should feel that they are part of the company and that the company recognizes them as such. Companies need to offer challenges and opportunities to the students. They should offer an adequate experience and maintain high standards.

The university-industry relations should be facilitated to minimise the time and resources commitment by the parties in order to increase their interests and demands.
Convincing more employers to be involved in sponsorship is closely linked to the relative nature of the degree and its direct association with their profession, sufficient supply of good quality graduates, making sure they get the best graduates and giving them early access to good engineering students.

It has been agreed that sponsoring the undergraduate students during their degree studies has a positive impact on the students as well as their sponsors. This research revealed that the participating parties are even more positive about the benefits of sponsorship as in today’s world,

- employers need access to highly qualified graduates who can perform at a high standard in order for them to survive in the competitive business world,
- universities need more contact and feedback from employers in order to recognize the frequently changing requirements of industry and hence update their programmes, and
- students need to access the work environment as early as possible during their degree studies to develop their professional skills over the years in order to be “marketable” and keep their skills level as high as the industry needs.

The stakeholders all agreed that sponsorship adds value to the education of the undergraduate engineering students and dispel the belief among the students that engineering is no longer a viable career.

8.3 Model

The research highlights sponsorship schemes are working very well for some engineering disciplines such as Civil and Building Engineering. The views and experiences of the parties involved in this engineering discipline have therefore been brought together to develop a model of good practice. This model is a range of practice standards that could be adapted by other engineering departments to help them design and operate sponsorship schemes for their undergraduate engineering students. The Figure 8-1: The proposed model illustrates the key elements of the model.
The research revealed three major issues preventing the development of new sponsorship schemes: lack of awareness and information among the parties about what they expect to gain, and what they expect to give; lack of understanding of their responsibilities; and lack of evaluation of the existing schemes. By taking these factors into account, the reality of the schemes will meet the parties’ expectations and their benefits will be maximised thus making the sponsorship schemes successful and sustainable.

As Figure 8-1 shows, the model consists of a conception phase plus a design phase, an implementation phase, and maintenance phase in a continuous loop.

In the conception phase the information has to be collected about the following issues:

- what is happening in the university and what the university can offer,
- what the employers can offer,
- the level of time and staff commitment required from the employers and the academic staff, and
- the level of the student’s commitment to the sponsor during and following graduation.

This information generates the stakeholders’ expectations from the scheme which is the input to the design phase. The purpose of the design phase is to create the scheme plan and make it clear what should be included and what should be dropped from the schemes.

As the results show, gaining experience is one the most important part of sponsorship. However, it should be noted that having experience is not enough. In fact, reflection on work experience is the important part in the learning process. Therefore, one key point that should be considered in designing sponsorship schemes is selecting learning activities that support students as they learn from experience while working on a real-world project. Each activity of the work placement should include the four phases of Kolb’s experiential learning cycle so that students would engage in a continual cycle of experiencing, examining, explaining, and applying. The learning cycle might begin with students’ personal involvement through concrete experiences; next, they should be given opportunity to reflect on this experience and look for meaning; then they can apply this
meaning to form a logical conclusion; and finally, they experiment with similar problems, which result in new concrete experiences (Kolb & Kolb, 2010).

In the design phase, tasks should be allocated to the parties and their responsibilities (which are the input to the implementation phase) should be defined.

In the implementation phase, the proposed plan is implemented and the parties’ views on the schemes are monitored through surveys and case studies and reports of their achievements and progress reports are produced. These attainments of the scheme are the inputs of the evaluation phase which aims to provide feedback for modifying the design. This stage should determine:

- how the achievements of the parties from sponsorship meets their expectations,
- how the scheme adds value to the education of the students, the employers and the department,
- how the schemes provide students with sufficient opportunity for reflection on their experiences, and
- what changes need to be made to improve the added values of the schemes.

This model could be used to provide better consistency of understanding, promote improved communication and relationships, and aid best practice and consistent levels of support.
Figure 8-1: The proposed model
8.4 Limitations

It is important to acknowledge that, as with any other research, there are a number of limitations to take into account when assessing the findings.

As mentioned in the Methodology chapter (Chapter 3), measuring impact can be a long term project as a series of different longitudinal and cross sectional studies have to be done. However, several series of data were collected within less than three years of this project. Three cross sectional studies were carried out in the academic years 2006-2007, 2007-2008, and 2008-2009. In addition to this, one longitudinal research was done (a group of students surveyed in 2006-2007 when they were in their first year of their studies and the same group were surveyed in 2009-2010 when they were in the final year of their studies).

While the research includes non sponsoring companies, the sample is dominated by the sponsoring engineering firms. Whilst the effort has been made to represent a range of industry views, it has to be acknowledged that there are sectors whose perspectives have not been captured.

Additionally, whilst the scope of this research is on the sponsorship schemes among the Faculty of Engineering in Loughborough University, a number of other schemes were investigated. Studying the other schemes is a topic worthy of investigation.

The academia study was drawn from a particular group of the staff who had experience of working with industry and their views may not be representative of the experience of other academic staff.

As mentioned in Chapter 2, despite the important role that sponsorship can play in preparing graduate engineers for industry, the information available about its extent, the reasons why some employers offer it and the views and reactions of students to it are limited. This partly explains the lack of relevant literature relating to sponsorship. A literature review was carried out in this research, mainly using higher education institution and governmental reports, as well as reviewing books, journal and conference papers, and using the experiences of the experts in this field. Mainly, the general issues
related to the student-university-employer link were identified and then the research specifically focused on the role and input of sponsorship into this link.

8.5 Recommendations for future work

This research revealed that the sponsored students are more employable. Obviously, from the students who apply for sponsorship only the best of them get sponsorship but it should be noted that there are still good students who do not apply for sponsorship at all. More data of the sponsored and non sponsored students’ academic performance during their degree study needed to reinforce the inquiry of whether the sponsored students end up with better results because they are higher quality in the first place or they are getting better because they are sponsored.

Further longitudinal and cross section studies should be carried out to include a larger survey sample, including other universities, other engineering disciplines, and industry sectors over a longer timescale.

The results obtained should be presented to individuals and experts within industry and universities for them to comment on. The proposed model should be discussed with employers and the academic staff in order to gain their views and examine its sustainability.

A further longitudinal study should be carried out with the students who have been surveyed during this research. This would highlight the areas of success and the areas which need further improvement.

Further research could be carried out to see the role of sponsorship on the parties’ success during the recent economic down turn and post recession recovery.

More research should be done to include a larger number of non sponsoring companies, departments without the sponsored programmes and non sponsored students to gather information on the barriers which limit their involvements in sponsorship.
References


https://www.bconstructive.co.uk/inspirescholarship

http://www.civil.soton.ac.uk/aboutus/partners

http://www.ice.org.uk

http://www.eng.bham.ac.uk/mechanical/study/undergrad/scholarship_respects.html

http://www.extension.unl.edu/c/document_library.html

http://www.survey.bris.ac.uk

http://portal.surrey.ac.uk
Appendix 1: The research timeline

- The year one timeline
- The year 2 and 3 timeline
### The Year One Timeline

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<tr>
<th>Task Name</th>
<th>Start</th>
<th>Finish</th>
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<tr>
<td>Basic planning</td>
<td>Mon 04/12/06</td>
<td>Mon 08/01/07</td>
</tr>
<tr>
<td>Preliminary literature review</td>
<td>Mon 04/12/06</td>
<td>Mon 08/01/07</td>
</tr>
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<td>Review research proposal</td>
<td>Fri 06/12/06</td>
<td>Mon 11/12/06</td>
</tr>
<tr>
<td>Identifying the first group of students to be surveyed</td>
<td>Thu 14/12/06</td>
<td>Wed 20/12/06</td>
</tr>
<tr>
<td>Identifying the area to be investigated and how?</td>
<td>Thu 14/12/06</td>
<td>Wed 20/12/06</td>
</tr>
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<td>Planning complete</td>
<td>Fri 05/01/07</td>
<td>Fri 05/01/07</td>
</tr>
<tr>
<td>Basic literature review</td>
<td>Mon 08/01/07</td>
<td>Mon 03/06/07</td>
</tr>
<tr>
<td>Literature studies, attending in training courses, workshops, and meetings</td>
<td>Mon 08/01/07</td>
<td>Mon 03/06/07</td>
</tr>
<tr>
<td>First questionnaire (first year students)</td>
<td>Wed 17/01/07</td>
<td>Tue 06/03/07</td>
</tr>
<tr>
<td>Second questionnaires (first year students)</td>
<td>Fri 02/03/07</td>
<td>Wed 21/03/07</td>
</tr>
<tr>
<td>Analysing the results</td>
<td>Fri 23/03/07</td>
<td>Wed 08/08/07</td>
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<tr>
<td>Basic literature review complete</td>
<td>Mon 03/06/07</td>
<td>Mon 03/06/07</td>
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<td>Documentation</td>
<td>Wed 01/08/07</td>
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<td>Report materials</td>
<td>Wed 01/08/07</td>
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<td>Review documentation</td>
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</table>

**The Year One Timeline Diagram**
The year 2 and 3 timeline
Appendix 2: Survey of student

- Survey of first year students
- Survey of final year students
- Survey of fourth year students
- Survey of recent graduates
Survey of first year students

Introduction

This survey is a part of a research programme looking at the impact of industrial sponsorship on industry, academia and students. Thank you for taking the time and effort to respond to this questionnaire. Please give your most candid and thorough response to the questions below. The information you share here will be treated in strict confidence by the researcher and will not be used for any other reason than this research. The information will be used for analysis purposes and only group anonymous data will be used in any publication.

ID: ___________________________ Programme:

Your ID will only be used to contact you for a possible follow up.

Gender:

☐ Male  ☐ Female

Your age when you started your university degree:

☐ 18  ☐ 19  ☐ 20  ☐ 21  ☐ 22  ☐ 23+

Your decision

1. Please indicate how important each of the following were in your choice of university?

1= Not important  2= Of little importance  3= Of minor importance
4= Fairly important  5= Important  6= Very important
2. Were you aware of the sponsorship scheme before you applied to your programme?
   - [ ] No
   - [ ] Yes

3. How much did the availability of sponsorship influence your decision when choosing your programme? *(Please tick one box only)*
   - [ ] Not at all
   - [ ] Very little
   - [ ] A little
   - [ ] In some ways
   - [ ] Quite a lot
   - [ ] Considerably

4. Did you apply for the sponsorship scheme run by your department?
   - [ ] No
   - [ ] Yes
   
   *If Yes, please go to question 8.*

5. If you have already sponsored, how did you get the sponsorship offer?
   - [ ] Applied directly to the sponsor company
   - [ ] Received sponsorship offer after placement
   - [ ] ICE QUEST scholarship
   - [ ] Other *(please specify):* ________________

6. If you did NOT apply for the sponsorship scheme run by your department, please indicate the effect of each of the following in your decision:
   - 1= Not at all
   - 2= Very little
   - 3= A little
   - 4= In some ways
   - 5= Quite a lot
   - 6= Considerable
Complicated application procedure | 1 2 3 4 5 6
University rules and conditions | 1 2 3 4 5 6
Sponsor company rules and conditions | 1 2 3 4 5 6
Lack of information about the scheme | 1 2 3 4 5 6
Lack of interest | 1 2 3 4 5 6
Busy schedules | 1 2 3 4 5 6
Lack of confidence | 1 2 3 4 5 6
Being already sponsored | 1 2 3 4 5 6

7. What changes to the scheme would encourage you to apply for sponsorship?

If you did NOT apply for the sponsorship scheme run by your department, please go to question 23.

8. Please indicate how important each of the following were in your decision to apply for sponsorship?

1= Not important  2= Of little importance  3= Of minor importance  4= Fairly important  5= Important  6= Very important

Extra funding | 1 2 3 4 5 6
Industrial experience | 1 2 3 4 5 6
Practical skills | 1 2 3 4 5 6
Guaranteed job | 1 2 3 4 5 6
Improved job chances elsewhere | 1 2 3 4 5 6
Extra training opportunities | 1 2 3 4 5 6
Other (please specify):
9. How did you first hear about the sponsorship scheme? (*Please tick one box only*)

- University website
- Prospectus / department brochure
- Advertisement / Publications
- Company websites
- Department visit / University open day
- Other, (*please specify*)

**Application procedure**

10. Please indicate your agreement with the following elements about application for sponsorship:

<table>
<thead>
<tr>
<th>1 = Strongly disagree</th>
<th>2 = Disagree</th>
<th>3 = Disagree slightly</th>
<th>4 = Agree slightly</th>
<th>5 = Agree</th>
<th>6 = Strongly agree</th>
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<tr>
<td>The information provided was clear</td>
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<tr>
<td>The company fair was useful</td>
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<td></td>
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<tr>
<td>The application form was easy to follow</td>
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<tr>
<td>The administrative process was efficient</td>
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<td></td>
</tr>
<tr>
<td>Other (<em>please specify</em>)</td>
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</tbody>
</table>

11. How could the application process be improved?

12. How many sponsorship interview(s) did you have? (*Please tick one box only*)

- 0
- 1
- 2
- 3
- 4+

13. Would you have liked to reprioritise your company choices after the interviews?

- No
- Yes

14. Did you receive any sponsorship offer?

- No
- Yes

*If Yes, please go to question 19.*
15. Do you think your CV and application form was satisfactory?

16. Do you think your interview technique was satisfactory?

17. Do you think you are lacking skills required by the companies?

18. What extra support could be giving in order to help you to obtain sponsorship?

If you are NOT in the sponsorship scheme run by your department, please go to question 23.

**The company**

19. Please indicate how important the following are about your contact/supervisor/line manager:

<table>
<thead>
<tr>
<th></th>
<th>1= Not important</th>
<th>2= Of little importance</th>
<th>3= Of minor importance</th>
<th>4= Fairly important</th>
<th>5= Important</th>
<th>6= Very important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is easy to approach and talk with</td>
<td>□    1 □    2 □    3 □    4 □    5 □    6</td>
<td></td>
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<tr>
<td>Motivates me to perform at my highest level</td>
<td>□    1 □    2 □    3 □    4 □    5 □    6</td>
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<tr>
<td>Treats me with dignity and respect</td>
<td>□    1 □    2 □    3 □    4 □    5 □    6</td>
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</tr>
<tr>
<td>Supports exceptional academic performance</td>
<td>□    1 □    2 □    3 □    4 □    5 □    6</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Answers my questions clearly</td>
<td>□    1 □    2 □    3 □    4 □    5 □    6</td>
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</tr>
<tr>
<td>Offers practical help and support</td>
<td>□    1 □    2 □    3 □    4 □    5 □    6</td>
<td></td>
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</tbody>
</table>
The sponsorship scheme

20. What do you expect to gain most from the sponsorship scheme?

21. What do you expect your sponsor company to gain most from the sponsorship scheme?

22. How well do you think the sponsorship scheme will support the following learning outcomes of your degree programme? (Please tick the relevant box for each statement listed below)

Knowledge and Understanding of:

<table>
<thead>
<tr>
<th>Statement</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apply knowledge in a professional environment</td>
<td></td>
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<tr>
<td>The management of projects</td>
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<td>The role of the professional engineer in society</td>
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</tr>
<tr>
<td>Work in a team environment</td>
<td></td>
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<tr>
<td>Use field equipment competently and safely</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Communicate effectively</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Manage time and resources</td>
<td></td>
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<tr>
<td>Balance risks and make decisions</td>
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<tr>
<td>Learn effectively, continuously and independently in a variety of environments</td>
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<td>Work effectively as part of a team and show potential for leadership</td>
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</tbody>
</table>

23. In general, how do you feel sponsorship will benefit you in your academic studies? (Please tick one box only)

  ■ Not at all  ■ Very little  ■ A little  ■ In some ways  ■ Quite a lot  ■ Considerably
24. What was your understanding of the sponsorship scheme before you came to university? *(Please tick one box only)*

- [ ] Very unclear
- [ ] Unclear
- [ ] Slightly unclear
- [ ] Slightly clear
- [ ] Clear
- [ ] Very clear

25. If you knew what you know now, would you apply for sponsorship today?

- [ ] No
- [ ] Yes

26. Would you recommend this scheme to other students?

- [ ] No
- [ ] Yes

Please list the reasons for your ‘Yes’ or your ‘No’.

---

*Thanks for taking the time to complete this questionnaire.*

Fakhteh Soltani Tafreshi,
engCETL,
Keith Green Building,
Loughborough University.
Loughborough LE11 3TU.
Email: F.Soltani-tafreshi@lboro.ac.uk
Survey of final year students

Introduction

This survey is a part of a research programme looking at the impact of industrial sponsorship on industry, academia and students. Thank you for taking the time and effort to respond to this questionnaire. Please give your most candid and thorough response to the questions below. The information you share here will be treated in strict confidence by the researcher and will not be used for any other reason than this research. The information will be used for analysis purposes and only group anonymous data will be used in any publication.

ID: ____________________ Programme: ____________________
Your ID will only be used to contact you for a possible follow up.

Gender:
☐ Male ☐ Female

Your age when you started your university degree:
☐ 18 ☐ 19 ☐ 20 ☐ 21 ☐ 22 ☐ 23+

Your decision

1. Please indicate how important each of the following were in your choice of university?

1= Not important    2= Of little importance    3= Of minor importance
4= Fairly important  5= Important             6= Very important
2. Were you aware of the sponsorship scheme before you applied to your programme?

☐ No  ☐ Yes

3. How much did the availability of sponsorship influence your decision when choosing your programme? *(Please tick one box only)*

☐ Not at all  ☐ Very little  ☐ A little  ☐ In some ways  ☐ Quite a lot  ☐ Considerably

4. Did you apply for the sponsorship scheme run by your department?

☐ No  ☐ Yes  

*If No, please go to question 9.*

5. How did you first hear about the sponsorship scheme? *(Please tick one box only)*

☐ University website  ☐ Company websites
☐ Prospectus /department brochure  ☐ Department visit /University open day
☐ Advertisement / Publications  ☐ Other, *(please specify)*

6. Please indicate how important each of the following were in your decision to apply for sponsorship?

1= Not important  2= Of little importance  3= Of minor importance
4= Fairly important  5= Important  6= Very important
### Application procedure

7. Please indicate your agreement with the following elements about application for sponsorship:

<table>
<thead>
<tr>
<th>Element</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>The information provided was clear</td>
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<tr>
<td>The information provided was useful</td>
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<tr>
<td>The application form was easy to follow</td>
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<tr>
<td>The interview was well organised</td>
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<td>The administrative process was efficient</td>
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<td>Other (please specify)</td>
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</tbody>
</table>

8. Were you offered sponsorship?

- [ ] No
- [ ] Yes

*If Yes, please go to question 11.*

9. Did you get any other sponsorship offer?

- [ ] No
- [ ] Yes

*If Yes, how did you get sponsorship?*

- [ ] Applied directly to the sponsor company
- [ ] Received sponsorship offer after placement
- [ ] Other (please specify):
10. If you did NOT apply for the sponsorship scheme run by your department, please indicate the effect of each of the following in your decision:

1= Not at all  2= Very little  3= A little  
4= In some ways  5= Quite a lot  6= Considerable

<table>
<thead>
<tr>
<th>Effect of Each Factor</th>
<th>Score</th>
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</thead>
<tbody>
<tr>
<td>Complicated application procedure</td>
<td></td>
</tr>
<tr>
<td>University rules and conditions</td>
<td></td>
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<tr>
<td>Sponsor company rules and conditions</td>
<td></td>
</tr>
<tr>
<td>Lack of information about the scheme</td>
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<tr>
<td>Lack of interest</td>
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<tr>
<td>Busy schedules</td>
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<tr>
<td>Lack of confidence</td>
<td></td>
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<tr>
<td>Being already sponsored</td>
<td></td>
</tr>
</tbody>
</table>

If you are NOT in the sponsorship scheme run by your department, please go to question 17.

The company

11. Please indicate how important the following are about your contact/supervisor/line manager:

1= Not important  2= Of little importance  3= Of minor importance  
4= Fairly important  5= Important  6= Very important

<table>
<thead>
<tr>
<th>Importance Factor</th>
<th>Score</th>
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<tbody>
<tr>
<td>Is easy to approach and talk with</td>
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12. How could the sponsorship scheme be improved?
13. What have you gained most from the sponsorship scheme?

14. What benefits do you think your sponsor company has gained from the sponsorship scheme?

15. What aspect(s) of the sponsorship scheme has influenced or impressed you the least?

16. In general, how do you feel you have benefited from the sponsorship element of your programme? (Please tick one box only)

- Not at all
- Very little
- A little
- In some ways
- Quite a lot
- Considerably

17. What was your understanding of the sponsorship scheme before you came to university? (Please tick one box only)

- Very unclear
- Unclear
- Slightly unclear
- Slightly clear
- Clear
- Very clear

18. If you knew what you know now, would you apply for sponsorship today?

- No
- Yes

19. Would you recommend this scheme to other students?

- No
- Yes

   Please list the reasons for your ‘Yes’ or your ‘No’.

20. How well did the sponsorship scheme support the following learning outcomes of your degree programme? (Please tick the relevant box for each statement)

   1= Not at all
   2= Very little
   3= A little
   4= In some ways
   5= Quite a lot
   6= Considerably
Knowledge and Understanding of:

<table>
<thead>
<tr>
<th>Knowledge and Understanding of:</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
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<tr>
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</tbody>
</table>

Job offer

21. Have you received a permanent job offer from your sponsor company?

☐ No    ☐ Yes    ☐ Not decided yet

22. If you receive an offer, will you accept it?

☐ No    ☐ Yes

23. Please indicate how important each of the following are in your decision to accept a job offer: (offered by your sponsor company or any other company)

1= Not important   2= Of little importance   3= Of minor importance   4= Fairly important   5= Important   6= Very important

<table>
<thead>
<tr>
<th>Duties of the job</th>
<th>1</th>
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<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
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<tbody>
<tr>
<td>Training and development programmes</td>
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<tr>
<td>Progress opportunities</td>
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<tr>
<td>Salary</td>
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<tr>
<td>Other benefits</td>
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<tr>
<td>Working conditions</td>
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</tr>
</tbody>
</table>
1= Not important  2= Of little importance  3= Of minor importance  4= Fairly important  5= Important  6= Very important

<table>
<thead>
<tr>
<th>Supervisor/line manager</th>
<th>[ ] 1</th>
<th>[ ] 2</th>
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<th>[ ] 4</th>
<th>[ ] 5</th>
<th>[ ] 6</th>
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</thead>
<tbody>
<tr>
<td>Location</td>
<td>[ ] 1</td>
<td>[ ] 2</td>
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<td>[ ] 4</td>
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<tr>
<td>Other (please specify)</td>
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<td>[ ] 4</td>
<td>[ ] 5</td>
<td>[ ] 6</td>
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</tbody>
</table>

24. Please indicate how important each of the following are in your decision to reject a job offer: (offered by your sponsor company or any other company)

1= Not important  2= Of little importance  3= Of minor importance  4= Fairly important  5= Important  6= Very important

<table>
<thead>
<tr>
<th>Better job opportunity</th>
<th>[ ] 1</th>
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<th>[ ] 3</th>
<th>[ ] 4</th>
<th>[ ] 5</th>
<th>[ ] 6</th>
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<tr>
<td>Pay and benefits</td>
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<td>[ ] 2</td>
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<tr>
<td>Location</td>
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<td>[ ] 4</td>
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<tr>
<td>Further study</td>
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<td>[ ] 4</td>
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<tr>
<td>Working conditions</td>
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<td>[ ] 2</td>
<td>[ ] 3</td>
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<td>[ ] 6</td>
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<tr>
<td>Self/Family employment</td>
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<td>[ ] 2</td>
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<tr>
<td>Moving out of Mechanical Engineering</td>
<td>[ ] 1</td>
<td>[ ] 2</td>
<td>[ ] 3</td>
<td>[ ] 4</td>
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<td>[ ] 6</td>
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<tr>
<td>Other (please specify)</td>
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</tbody>
</table>

Thanks for taking the time to complete this questionnaire.

Fakhteh Soltani Tafreshi,  
engCETL,  
Keith Green Building,  
Loughborough University,  
Loughborough LE11 3TU.  
Email: F.Soltani-tafreshi@lboro.ac.uk
Survey of fourth year students

Introduction

Thank you for taking the time to take part in this survey. The survey is a part of a research programme looking at the impact of industrial sponsorship. It would be helpful if we could find your views on the experience of sponsorship and its impact on you as an individual. At the end please feel free to add any further comments. Throughout this questionnaire “sponsorship scheme” refers to the Loughborough University scheme unless otherwise stated. The information you share here will be treated in strict confidence by the researcher and will not be used for any other reason than this research. The information will be used for analysis purposes and only group anonymous data will be used in any publication.

ID: ___________________________ Programme: ___________________________

If you are NOT in the sponsorship scheme run by your department, please go to question 9.

1. How long have you spent with your sponsoring company so far?
   During your placement ___________________________
   In total ___________________________

If you have not been on placement yet, please give the reason(s):

2. Do you feel you have benefited from the sponsorship scheme?
   - Not at all   - Very little   - A little   - In some ways   - Quite a lot   - Considerably
3. Please indicate the role of sponsorship element of your programme in gaining each of the following:

<table>
<thead>
<tr>
<th>1= Not important</th>
<th>2= Of little importance</th>
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<th>4= Fairly important</th>
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<tbody>
<tr>
<td>Extra funding</td>
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<tr>
<td>Industrial experience</td>
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<td>Practical skills</td>
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<tr>
<td>Improved job chances</td>
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<td>Extra training</td>
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<td>Other (please specify):</td>
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</table>

4. What benefits do you think your sponsor company has gained from the sponsorship scheme?

5. Were there any disadvantages with the sponsorship?

6. Would you encourage other students to take up sponsorship?

   □ No  □ Yes

   Please list the reasons for your ‘Yes’ or your ‘No’.

7. Do you think the sponsors’ attitudes have been changed during the last 18 months due to the economic changes?

   □ No  □ Yes
8. How well did the sponsorship scheme support the following learning outcomes of your degree programme? *(Please tick the relevant box for each statement listed below)*

1 = Not at all    2 = Very little    3 = A little
4 = In some ways  5 = Quite a lot   6 = Considerably

<table>
<thead>
<tr>
<th>Knowledge and Understanding of:</th>
<th>1</th>
<th>2</th>
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<tbody>
<tr>
<td>Apply knowledge in a professional environment</td>
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<td>Work in a team environment</td>
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<td>Use field equipment competently and safely</td>
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<td>Communicate effectively</td>
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<td>Learn effectively, continuously and independently in a</td>
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<td>Work effectively as part of a team and show potential</td>
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9. Do you think there are any barriers which prevent more students applying for sponsorship?

10. Do you feel you could have benefited the most from being in a

- [ ] degree without sandwich placement or sponsorship
- [ ] degree with sandwich placement only
- [ ] sponsored degree without sandwich placement
- [ ] sponsored degree with sandwich placement
Please give your reason(s):

11. Have you received a permanent job offer from your sponsor (or any other) company?

☐ No  ☐ Yes

12. If you receive an offer, will you accept it?

☐ No  ☐ Yes  ☐ Not decided yet

13. Please indicate how important each of the following are in your decision to accept a job offer:
   (offered by your sponsor company or any other company)

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14. Please indicate how important each of the following are in your decision to reject a job offer: (offered by your sponsor company or any other company)

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<th>4= Fairly important</th>
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<th>6= Very important</th>
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</table>
Better job opportunity  □ 1  □ 2  □ 3  □ 4  □ 5  □ 6  
Conflict with managers □ 1  □ 2  □ 3  □ 4  □ 5  □ 6  
Job expectations □ 1  □ 2  □ 3  □ 4  □ 5  □ 6  
Not challenging □ 1  □ 2  □ 3  □ 4  □ 5  □ 6  
Pay and benefits □ 1  □ 2  □ 3  □ 4  □ 5  □ 6  
Location □ 1  □ 2  □ 3  □ 4  □ 5  □ 6  
Further study □ 1  □ 2  □ 3  □ 4  □ 5  □ 6  
Working conditions □ 1  □ 2  □ 3  □ 4  □ 5  □ 6  
Self/Family employment □ 1  □ 2  □ 3  □ 4  □ 5  □ 6  
Moving out of Mechanical Engineering □ 1  □ 2  □ 3  □ 4  □ 5  □ 6  
Other (please specify) □ 1  □ 2  □ 3  □ 4  □ 5  □ 6  

Any further comments:  

Thank you for your time.

Fakhteh Soltani Tafreshi,  
engCETL, Keith Green Building.  
Loughborough University, LE11 3TU.  
Email: F.Soltani-tafreshi@lboro.ac.uk
Survey of recent graduates

Introduction

Thank you for taking the time to take part in this survey. The survey is a part of a research programme looking at the impact of industrial sponsorship on industry, academia and students in order to develop sustainable models of effective practice for further dissemination. It would be helpful if we could find your views on the experience of sponsorship and its impact on you as individual and your career. At the end please feel free to add any further comments. Throughout this questionnaire “sponsorship scheme” refers to the Loughborough University scheme unless otherwise stated. The information you share here will be treated in strict confidence by the researcher and will not be used for any other reason than this research. The information will be used for analysis purposes and only group anonymous data will be used in any publication.

1. How long have you spent with sponsoring company?
   - During your study:
   - After graduation:

2. Do you feel you have benefited from the sponsorship scheme?
   - Not at all
   - Very little
   - A little
   - In some ways
   - Quite a lot
   - Considerably

3. What have you gained from the sponsorship?

Private & Confidential
4. Were there any disadvantages with the sponsorship?

5. Do you think there are any barriers which prevent more students applying for sponsorship or to sponsored programmes?

6. Do you feel you could have benefited the most from being in a

- degree without sandwich placement or sponsorship
- degree with sandwich placement only
- sponsored degree without sandwich placement
- sponsored degree with sandwich placement

*Please give your reason(s):*

7. Would you encourage other students to take up sponsorship?

- No
- Yes

*Please list the reasons for your ‘Yes’ or your ‘No’.*
Any further comments:

Thanks for taking the time to complete this questionnaire.
Fakhteh Soltani Tafreshi,  
engCETL,
Keith Green Building.  
Loughborough University.  
Loughborough LE11 3TU.  
Email: F.Soltani-tafreshi@lboro.ac.uk
Appendix 3: Interviews with industry

- Interviews with sponsoring companies
- Interviews with non sponsoring companies
Introduction

This survey is a part of a research programme looking at the impact of industrial sponsorship on industry, academia and students in order to develop sustainable models of effective practice for further dissemination. Throughout this questionnaire sponsorship scheme refers to Loughborough University scheme unless otherwise stated. Thank you for taking the time to take part in this survey. The information you share here will be treated in strict confidence by the researcher and will not be used for any other reason than this research. The information will be used for analysis purposes and only group anonymous data will be used in any publication.

Your choice

1. Please indicate how important each of the following are in offering sponsorship.

   | Option                                              | 1 | 2 | 3 | 4 | 5 | 6 |
---|----------------------------------------------------|---|---|---|---|---|---|
   | Cost effective recruitment method                   |   |   |   |   |   |   |
   | To be involved in teaching/training of graduates    |   |   |   |   |   |   |
   | To ensure a supply of future engineers              |   |   |   |   |   |   |
   | To ensure recruitment of enough well trained graduates |   |   |   |   |   |   |
   | To increase company’s reputation                    |   |   |   |   |   |   |
   | To minimise overall training costs                 |   |   |   |   |   |   |
   | Other (please specify):                            |   |   |   |   |   |   |

2. Do you prefer to recruit:

   - [ ] Sponsored students
   - [ ] Direct entrant engineering graduates

   Please give your reason(s):
3. Do you prefer to offer:
   - [ ] Sandwich placements only
   - [ ] Sponsorship
   Please give your reason(s):

**Skills**

4. Please indicate your agreement with the following statements about comparison of sponsored graduates and direct entrant graduates:
   - [ ] 1= Strongly disagree  [ ] 2= Disagree  [ ] 3= Disagree slightly
   - [ ] 4= Agree slightly  [ ] 5= Agree  [ ] 6= Strongly agree

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<td>have more ability to apply theory in practice</td>
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<td>have better knowledge of the construction discipline</td>
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<td>have better knowledge of the commercial implication of engineering decisions</td>
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<td>have better communication skills</td>
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<td>have better team-working skills</td>
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<td>are more productive</td>
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<td>progress further and faster in the company</td>
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<td>stay longer with the company</td>
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<td>Other (please specify):</td>
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**The sponsorship scheme**

5. In general, how do you feel your company has benefited from the sponsorship scheme?
   - [ ] Not at all  [ ] Very little  [ ] A little  [ ] In some ways  [ ] Quite a lot  [ ] Considerably
6. What has your company gained most from the sponsorship scheme?

7. What aspects of the sponsorship scheme have influenced or impressed you the most?

8. What aspects of the sponsorship scheme have influenced or impressed you the least?

9. What benefits do you think sponsored students gain from the sponsorship scheme?

10. What benefits do you think the Department gains from the sponsorship scheme?

11. What factors are important when choosing a degree programme to sponsor?
12. What factors are important when choosing a university to be linked with?

13. How many universities are you linked with through undergraduate sponsorship?
   1  2  3  4+

14. How long have you been linked with Loughborough University?
   Less than a year  1  2  3  4+

15. Do you intend to continue your relation with Loughborough University?
   Yes  No  Please give your reason(s):

16. How many applications for sponsorship did you have in the 2006-2007 academic year?
   From Loughborough University  In total

17. How many sponsorships did you offer in the 2006-2007 academic year?
   To Loughborough University students  In total

18. Are your sponsorship needs satisfied by the number of students available?
   From Loughborough University:  Yes  No
   In total:  Yes  No

19. Would you like to increase the number of sponsorships offered to the students?
   Yes  No  Please give your reason(s):

20. How do you rank the relationship between sponsored students and industrial contacts?
   Very poor  Poor  Fairly  Fairly good  Good  Very good
   How could it be improved?
21. How do you rank the relationship between university and industrial contacts?
   - [ ] Very poor
   - [ ] Poor
   - [ ] Fairly
   - [ ] Fairly good
   - [ ] Good
   - [ ] Very good

   How could it be improved?

22. In general, does the reality of sponsorship meet your expectation?
   - [ ] Yes
   - [ ] No
   - Comments:

23. How could the students’ awareness of sponsorship be increased?

24. In your opinion are there any areas of the Loughborough University sponsorship scheme that could be improved?

**Job offer**

25. How many jobs did you offer to sponsored students in the 2006-2007 academic year?
   - To Loughborough University Students
   - In total

26. How many sponsored students accepted the offer in the 2006-2007 academic year?
   - Loughborough University students
   - In total
27. How important are the following factors in your decision to offer a job:

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<tr>
<th>Factor</th>
<th>1= Not important</th>
<th>2= Of little importance</th>
<th>3= Of minor importance</th>
<th>4= Fairly important</th>
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<th>6= Very important</th>
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<td>Academic performance of student</td>
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<td>Academic reputation of university</td>
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<td>Other (please specify):</td>
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Open discussion:

Thank you for your time.
Interview with non-sponsoring companies

Introduction

This survey is a part of a research programme looking at the industry input into the education of undergraduate engineering students and aims to develop sustainable models of effective practice for further dissemination. Thank you for taking the time to take part in this survey. The information you share here will be treated in strict confidence by the researcher and will not be used for any other reason than this research. The information will be used for analysis purposes and only group anonymous data will be used in any publication.

1. How long have you been offering work placement to Loughborough students?
   - Less than a year
   - 1 year
   - 2 year
   - 3 year
   - 4+

2. How many places do you offer to Loughborough students each year?

3. Do you offer any sponsorship to undergraduate students from other universities?
   - No
   - Yes

4. Do you offer sponsorship to Loughborough students after work placement?
   - No
   - Yes

5. Do you know about the Loughborough sponsorship scheme?
   - No
   - Yes

6. Would you like to receive further information regarding the scheme?
   - No
   - Yes

7. Have you ever been involved in the Loughborough University sponsorship scheme?
   - No
   - Yes
If yes why did you terminate your links?

8. Would you consider becoming a part of the Loughborough sponsorship scheme in the future?
   [ ] No  [ ] Yes

9. Which barriers prevent offering sponsorship?

10. Please indicate the effect of each of the following in your decision not to offer sponsorship:
    1= Not at all  2= Very little  3= A little
    4= In some ways  5= Quite a lot  6= Considerably

    | Overall cost | 1 | 2 | 3 | 4 | 5 | 6 |
    | Time commitment | 1 | 2 | 3 | 4 | 5 | 6 |
    | Resources commitment | 1 | 2 | 3 | 4 | 5 | 6 |
    | Company policy | 1 | 2 | 3 | 4 | 5 | 6 |
    | University rules and conditions | 1 | 2 | 3 | 4 | 5 | 6 |
    | Lack of information | 1 | 2 | 3 | 4 | 5 | 6 |
    | Other (please specify): |

11. Do you think long term relation between students and industry would improve:
    1= Not at all  2= Very little  3= A little
    4= In some ways  5= Quite a lot  6= Considerably

    | Your graduate recruitment | 1 | 2 | 3 | 4 | 5 | 6 |
    | Quality of graduate engineers | 1 | 2 | 3 | 4 | 5 | 6 |
    | Quality of university programme | 1 | 2 | 3 | 4 | 5 | 6 |
12. Are there sufficient graduates available to meet your company’s needs?

[ ] No  [ ] Yes

13. Is the quality of available graduates sufficient to meet your company’s needs?

[ ] No  [ ] Yes

14. Do you have a graduate development programme in your company?

[ ] No  [ ] Yes

15. Please indicate your agreement with the following statements:

1= Strongly disagree  2= Disagree  3= Disagree slightly  
4= Agree slightly  5= Agree  6= Strongly agree

- Providing industrial work placement is an opportunity to evaluate potential employees at early stage of their careers
- Sponsoring undergraduate students is a better opportunity to evaluate potential employees at early stage of their careers
- The number of sponsored students is affecting the number of graduates available for employment for other companies

16. What portion of jobs have you been offered in the past to students who completed their work placements in your company?

[ ] None  [ ] up to 25%  [ ] 25-50%  [ ] 50-75%  [ ] 75-100%

17. How important are the following factors in your decision to offer a job:

1= Not important  2= Of little importance  3= Of minor importance  
4= Fairly important  5= Important  6= Very important

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<th>Factor</th>
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4 = Fairly important  5 = Important  6 = Very important

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Open discussion:

Thank you for your time.
Appendix 4: Interviews with academics

- Interview with Departments with sponsored programmes
- Interview with Departments with no employer sponsorship
Interview with Departments with sponsored programmes

Introduction

This survey is a part of a research programme looking at the impact of industrial sponsorship on industry, academia and students. Thank you for your time in taking part in this interview. The information you share here will be treated in strict confidence by the researcher and will not be used for any other reason than this research. The information will be used for analysis purposes and only group anonymous data will be used in any publication.

Thank you for your time.
Fakhteh Soltani Tafreshi,
engCETL,
Loughborough University.
Loughborough LE11 3TU.
Tel: 01509 227189
Email: F.Soltani-tafreshi@lboro.ac.uk
1. Please indicate your agreement with the following statements about comparison of sponsored students and non sponsored students on their graduation:

<table>
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<th>Statement</th>
<th>Options</th>
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<td>1= Strongly disagree</td>
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<td>have better understanding of their future career as an engineer</td>
<td>[ ] 1</td>
</tr>
<tr>
<td>have better knowledge of the commercial implication of engineering decisions</td>
<td>[ ] 1</td>
</tr>
<tr>
<td>have better communication skills</td>
<td>[ ] 1</td>
</tr>
<tr>
<td>have better team-working skills</td>
<td>[ ] 1</td>
</tr>
<tr>
<td>are more productive</td>
<td>[ ] 1</td>
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<tr>
<td>Other (please specify):</td>
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Comments:

2. Do you think offering sponsored undergraduate programmes would improve:

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<th>Improvement</th>
<th>Options</th>
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<tr>
<td>Your graduate recruitment</td>
<td>[ ] 1</td>
</tr>
<tr>
<td>Quantity of graduate engineers</td>
<td>[ ] 1</td>
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<tr>
<td>Quality of graduate engineers</td>
<td>[ ] 1</td>
</tr>
<tr>
<td>Quality of university programme</td>
<td>[ ] 1</td>
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</table>

Comments:
3. Are there sufficient graduates available in your discipline to meet industry’s needs?
   Yes  ■  No  ■

4. Is the quality of available graduates in your discipline sufficient to meet industry’s needs?
   Yes  ■  No  ■

5. Please indicate your agreement with the following statements:
   1= Strongly disagree  2= Disagree  3= Disagree slightly
   4= Agree slightly    5= Agree    6= Strongly agree

   Sponsoring undergraduate students is an opportunity for employers to evaluate potential employees at early stage of their careers  ■ 1  ■ 2  ■ 3  ■ 4  ■ 5  ■ 6

   The number of sponsored students is affecting the number of graduates available for employment for other companies  ■ 1  ■ 2  ■ 3  ■ 4  ■ 5  ■ 6

Comments:

The sponsorship scheme

6. In general, how do you feel your department has benefited from the sponsorship scheme?
   ■ Not at all  ■ Very little  ■ A little  ■ In some ways  ■ Quite a lot  ■ Considerably

7. What has your department gained most from the sponsorship scheme?


8. What aspects of the sponsorship scheme have influenced or impressed you the least?


9. What benefits do you think sponsored students gain from the sponsorship scheme?

10. What benefits do you think the sponsoring companies gain from the sponsorship scheme?

11. How do you rank the relationship between university and industrial contacts?

   [ ] Very poor  [ ] Poor  [ ] Fairly  [ ] Fairly good  [ ] Good  [ ] Very good

   How could it be improved?

12. In general, does the reality of sponsorship meet your expectation?

   Yes  [ ] No  [ ]

   Comments:

13. In your opinion are there any areas of the sponsorship scheme that could be improved?

   [ ]
14. How many applications for sponsorship did you have in the 2007-2008 academic year?

15. How many sponsorships were offered in the 2007-2008 academic year?

16. How could the students’ awareness of sponsorship be increased?

University-Industry relationship
17. How many companies are you linked with through undergraduate sponsorship?

18. What factors are important when choosing a partner company?

19. How can industry be convinced to sponsor students?
20. In your opinion, do you think there are any barriers which prevent companies offering sponsorship?

21. In your opinion, do you think there are any barriers which prevent department offering more sponsored programmes?

22. In your opinion, do you think there are any barriers which prevent more students to apply for sponsorship?

23. What can Departments do to overcome the barriers?

24. What can employers do to overcome the barriers?

Open discussion:
Interview with Departments with no employer sponsorship

Introduction

This survey is a part of a research programme looking at the impact of industrial involvement on industry, academia and students. Thank you for your time in taking part in this interview. The information you share here will be treated in strict confidence by the researcher and will not be used for any other reason than this research. The information will be used for analysis purposes and only group anonymous data will be used in any publication.

Thank you for your time.
Fakhteh Soltani Tafreshi,
engCETL,
Loughborough University.
Loughborough LE11 3TU.
Tel: 01509 227189
Email: F.Soltani-tafreshi@lboro.ac.uk
1. Are there sufficient graduates available in your discipline to meet the needs of industry nationally?
   Yes ☐  No ☐  How can the number of students be increased?

2. Do employers in your discipline think that the quality of available graduates sufficient to meet their needs?
   Yes ☐  No ☐  How can the quality of students be improved?

3. Do you think industrial involvement in undergraduate programmes would improve:
   1= Not at all  2= Very little  3= A little
   4= In some ways  5= Quite a lot  6= Considerably

<table>
<thead>
<tr>
<th>Your graduate recruitment</th>
<th>1 2 3 4 5 6</th>
</tr>
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<tbody>
<tr>
<td>Quantity of graduate engineers</td>
<td>1 2 3 4 5 6</td>
</tr>
<tr>
<td>Quality of graduate engineers</td>
<td>1 2 3 4 5 6</td>
</tr>
<tr>
<td>Quality of university programme</td>
<td>1 2 3 4 5 6</td>
</tr>
</tbody>
</table>

   Comments:

4. Are there any sponsored students in your programme?
   Do you know how many?

5. Have you ever considered introducing a formal sponsorship scheme?

6. In general, do you feel your department could benefit from a sponsorship scheme?
   ☐ Not at all  ☐ Very little  ☐ A little  ☐ In some ways  ☐ Quite a lot  ☐ Considerably
7. What form do you think these benefits could take?

8. Which of the following factors would influence your decision not to develop employer sponsorship in your department:
   1= Not at all   2= Very little   3= A little   4= In some ways   5= Quite a lot   6= Considerably

<table>
<thead>
<tr>
<th>Factor</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
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<tr>
<td>Time commitment</td>
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<td>Staff commitment</td>
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<tr>
<td>University regulations</td>
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<td>Lack of interest from employers</td>
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<td>Lack of interest in the Department</td>
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<tr>
<td>Lack of interest from students</td>
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<tr>
<td>Other (please specify):</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Comments:

9. What other barriers might prevent department offering sponsored programme?
10. In your opinion, do you think there are any barriers which prevent companies offering sponsorship?

11. In your opinion, do you think there are any barriers which prevent more students to apply for sponsorship?

12. What can Department do to overcome the barriers?

13. What can employers do to overcome the barriers?

Open discussion:

Thank you for your time.
Appendix 5: Training record
# Postgraduate Research Student Skills Training Record

## Training Summary

**Year 2006-2010**

### Name of student
- Fakhteh Soltani Tafreshi

### Full-time/Part-time
- Full-Time

### Name(s) of Supervisor(s)
- Dr. David Twigg
- Prof. John Dickens

### Department
- Civil & Building Engineering

### Date | Training courses, meetings and conferences | Place | Number of days
--- | --- | --- | ---
11 Jan 2007 | Critical reading for self-critical writing | London | 1
25 Jan 2007 | Research training | Chem Eng – Loughborough University | 1/2
30 Jan 2007 | ABC of pedagogy research | Leicester University | 1
06 Feb 2007 | Research panel meeting | engCETL-Loughborough University | 1/2
14 Feb 2007 | Annual meeting with sponsor companies | Civil & Building Eng. – Loughborough University | 1
08 March 2007 | SCEPTrE meeting | Surrey University | 1
21 March 2007 | Meeting with Surrey University, Southampton University and the ICE | ICE - London | 1
27 - 28 March 2007 | PdgR workshop | engCETL-Loughborough University | 2
11 April 2007 | Group meeting | engCETL-Loughborough University | 1/2
27 April 2007 | Designing and producing conference posters | PD-Loughborough University | 1/2
16 May 2007 | Introducing pedagogic research methods | Camden - London | 1
26 June 2007 | Reading for research | PD-Loughborough University | 1/2
15 August 2007 | PGR meeting the skills training requirements | PD- Online course Loughborough University | 1/2
24 Sep 2007 | Research panel meeting | engCETL-Loughborough University | 1/2
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<thead>
<tr>
<th>Date</th>
<th>Training courses, meetings and conferences</th>
<th>Place</th>
<th>Number of days</th>
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<tr>
<td>12 Oct 2007</td>
<td>An introduction to online research methods</td>
<td>Manchester University</td>
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<tr>
<td>18 - 19 Oct 2007</td>
<td>ACED 2007 conference</td>
<td>engCETL-Loughborough University</td>
<td>1 &amp; 1/2</td>
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<tr>
<td>1 Nov 2007</td>
<td>CourseGenie Support Guide</td>
<td>PD- Online course Loughborough University</td>
<td>1/2</td>
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<td>14 Nov 2007</td>
<td>Company fair</td>
<td>Civil &amp; Building Eng. – Loughborough University</td>
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<td>09-12 Dec 2007</td>
<td>Australasian Associate for Engineering Education conference – Paper presented</td>
<td>Melbourne, Australia</td>
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<td>14 Feb 2008</td>
<td>Sponsorship consortia annual meeting</td>
<td>Civil &amp; Building Eng. – Loughborough University</td>
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<td>The role and significance of pedagogic research in HE</td>
<td>Middlesex University</td>
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<td>PD- Loughborough University</td>
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<td>engCETL-Loughborough University</td>
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<td>Loughborough University</td>
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<td>Developing STEM education research practice</td>
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<td>Coventry University</td>
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<td>06 – 08 July 2010</td>
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<td>Birmingham - UK</td>
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<tr>
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