

Performance of New Business Ventures from the University of Cambridge

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Peter Hiscocks

**Institute for Manufacturing
University of Cambridge
Cambridge CB2 1RX**

Executive Summary

310 spin-off and start-up companies have been created from the University of Cambridge according to this research of which 252 are still trading in some form or other. Financial and other performance data were sought from these companies and information has been obtained from 172 of these companies. These data show the companies have a combined market capitalisation of £4,170 million and employ more than 8,800 people; most of this employment is in the UK.

These results indicate a significant level of economic benefit at both a regional and national level resulting from University of Cambridge created new business ventures. These new business ventures add value to the economy through job creation and wealth creation; they add value to the UK Exchequer through taxes paid, and in the long term they may add value to the University as a result of equity realisations (where the University holds shares in the company) or through possible endowment donations from successful entrepreneurs.

Beneficial interactions between Universities and Business

Interactions between universities and the business community are recognised increasingly as being beneficial to all the parties involved. The focus of these interactions was originally on the benefits deriving to the universities, businesses and individuals that are involved. More recently there has been an increased interest in the potential for these interactions to add significant value to the regional and national economy. Indeed, the Lambert Review of 2003 was set up to review university and business interactions and to identify how they could be made to work more effectively.

There is a wide range of interactions that may take place and these may provide different types of value to the parties involved. These interactions may include:

- Research collaborations - where companies fund research programmes within universities

- Licensing of intellectual property – where the university charges a company for the access to, and use of, specific areas of intellectual property, eg a patent
- Consultancy – where university academics and researchers may exchange their knowledge and work for companies or other organisations under specified contracts
- New venture creation – where university staff may set up a new business venture based on the knowledge they have gained from their work at the university

These university business interactions will produce different results with different timescales. Furthermore, some of the interactions will have a greater direct benefit to the relevant university; other interactions will direct most of their beneficial results in different directions such as the local and national economy. For example, a university may license a patent to a business and may expect a revenue stream within a small number of years. The principal beneficiaries of such an interaction will be the university itself and in most cases the academic inventors with whom the revenues will be shared. If the intellectual property is licensed to a business in the UK then there may be additional benefits from the profits on the sale of the products within the UK and this should help increase sales, profits, employment, government tax revenues and possibly exports. However, most of these wider economic benefits to the UK will arise only if the intellectual property is licensed to a UK company.

The creation of a new business venture as a result of university knowledge may add value back to the university itself if the university has an equity stake in the new business and it has the opportunity to sell this equity stake at some point in time. The timescale for the realisation of such value is usually much longer than the timescale for realisation of value from a licence, often taking more than 10 or 15 years before a liquidity opportunity arises. These new business ventures, especially if they are successful, are likely to add significant benefits to the regional and national economies. The benefits to the economy are likely to be in the form of the creation of the new business itself; new products (hopefully with a higher value-add and differentiation from competitors); new jobs; greater exports (there is evidence that high tech new companies have a significantly higher export level than traditional businesses); taxation revenues for the exchequer on both the businesses themselves and the income tax on employees: all these contribute significantly to the wealth of the regional and national economy. However, to date the measurement of these benefits has been difficult to determine and, by and large, such studies have not been done.

Measurement of Beneficial Returns

During the past five years universities have been increasingly effective in measuring the level of value generated for them from commercialisation activities and a national report

is collated and published annually on these matters called The Higher Education Business and Community Interaction Report – HEBCI. The measures identifying benefits relating to the universities themselves, such as the level of industrial sponsorship of research programmes or the level of licence income received, are well documented and are quite precise. A level of benefit that is much less well documented, even from the HEBCI study, is the beneficial effect on the national economy from new business ventures established on the basis of university knowledge. This paper sets out a process to provide an appropriate measure of value of new venture creation and uses the new ventures created from the University of Cambridge as a working example. It does not look at the economic impact of other activities of the University of Cambridge such as teaching, research papers, licensing activities, consultancy, etc.

Purpose

The purpose of this paper is to establish an approach for measuring the principal economic benefits resulting from new businesses that are created based upon knowledge generated from the University of Cambridge. This process will then be used to estimate the economic impact of the new ventures that have built their companies on knowledge from the University of Cambridge. The aim is to repeat this analysis each year using the same research process and thereby to be able to measure results from year to year and to track changes and plot trends. It will also provide regional and central government with an indication of the overall effectiveness of universities in converting research investment into economic value in the UK community. The research methodology has also been designed in a way that should make it relevant for use by other universities to measure the economic benefits resulting from new business creation arising from their activities. If this methodology is adopted by other universities it should add significantly to the comparative data available on the impact of universities on new business creation and, as a result, growth in economic benefit resulting from university knowledge transfer.

Objectives

The objectives of this work programme are:

1. develop an appropriate and repeatable process to identify new businesses that have been created based on University of Cambridge knowledge and to measure the key parameters of these businesses
2. to carry out such a data collection exercise, to analyse the data, produce results and conclusions
3. to repeat this analysis every year using the same research methodology, data collection and analysis approaches

In the future it may be desirable to test this approach with other university business creation activities.

Scope and Focus – Definitions

This paper and its results are focused on the new business ventures created based on university knowledge; specifically, knowledge from the University of Cambridge. The University of Cambridge has a unique intellectual property ownership policy amongst UK universities in that, in the case of some inventions the university owns the intellectual property and in some cases it does not. This leads to two different types of business ventures being created based on knowledge from the University of Cambridge; spin-offs and start-ups.

Spin-offs: a spin-off is defined as a company based on intellectual property owned by the University of Cambridge; a company in which the University has an equity stake; that was created by members of the University of Cambridge; that has been formally established as a company and has trading activity

Start-ups: a start-up is a company based on knowledge from the University of Cambridge and where that knowledge is a key element in enabling the business to come into existence or to be competitive with its products/services

It can be seen from the above that the definition of *spin-offs* is much narrower than for *start-ups* and, as can be imagined, there are relatively few spin-offs and a lot more start-ups.

It is important to say a few more words about the *start-up* definition. For the purposes of this measurement process a *start-up* has been taken requiring one or more of the following:

- a new venture created where the key knowledge elements of competitive differentiation for the business can be traced back to the University of Cambridge
- the business creators were academics, researchers or students at the University of Cambridge within 5 years (this may be extended in specific circumstances) of the establishment of their new business venture and the research they carried out at the University of Cambridge was of importance in developing the competitiveness of their new business
- the creators of the business consider that some elements of knowledge, training or skill from the University of Cambridge was critical in the establishment of the business

A company will not be defined as a start-up just because it has been created by an alumnus of the University of Cambridge; to be included as a start-up it is important that the knowledge, support or training gained at the University was a critical element in the establishment of the business.

It can be noted from the above that the University does not necessarily own any equity in a start-up and may receive no direct benefit from the success of the company. However, start-up businesses do add value to the economy through the development of new products, increased sales, additional employment, possible exports, and the tax take from founders, employees, and the corporation itself.

Accuracy & Precision

It is difficult to get precise and accurate data on new business ventures, their relationship with the University of Cambridge, their recent financial performance and to determine a policy to deal with companies that merge, are acquired or cease trading. To carry-out this research study a methodology has been developed that should be robust and repeatable within the defined approach whilst recognising certain limits.

The List of Companies: a list of companies has been established where those companies have relied in some way on University of Cambridge knowledge, support and assistance, mentoring, financial or other investment for their existence and/or position in the marketplace. The list of ‘spin-off companies’ is precise and definitive and is shown in Appendix 1. The list of ‘start-up companies’ is a more difficult matter and has been developed during the past four years based on personal knowledge, interviews with key business people in the Cambridge area, reviews of databases and finally, contacts with the businesses themselves. This list is not precise or definitive but it is considered that the majority of new business ventures created from the University of Cambridge are included in the list. Furthermore, the list is considered adequate for the current analysis and is being refined all the time. However, there may be both type 1 and type 2 errors:

Type 1 and Type 2 Errors: Type 1 errors in the list of companies occur when a business is not identified as being linked to the University of Cambridge and it should be. This may happen because there is no record or knowledge of the business and its relationship to the University, or occasionally because the founders of the business have determined that they don’t want the business to be considered as having any links to the University. It is considered that there is still a reasonably large number of type 1 errors in the current analysis but that most of the big businesses have been identified and, as this analysis is repeated in future years, companies that were not known should come to light and will be added-in to the list.

Type 2 errors occur when a company is included in the list and it should not be included. Definitions for companies that are included can be seen in the section ‘Scope and Focus – Definitions’ above, but one of the final tests has been to ask the founders of the business if they consider that their company has relied in its formation and success on University of Cambridge knowledge and assistance. Companies are only included in the list if they agree that the business has relied on University of Cambridge knowledge.

Mergers and Acquisitions: a common occurrence with small and early stage technology based new ventures is that they are acquired, merged or otherwise change

their trading status. Most Cambridge-founded high technology businesses that are bought or merged into other businesses continue to trade in the UK and to employ staff; indeed, sometimes the acquisition can result in further investment in the Cambridge part of the business and there can be expansion of products, revenues and staff.

For the purposes of this study it is proposed that companies that are acquired or otherwise change their trading status (but continue to exist in a changed form) will be included in the survey for a period of ten years after their acquisition. For the purposes of revenue, employees, etc, the figures used will be those for the last full year of trading before their status was changed. At the end of the ten year period they will be removed from the analysis.

Developing the list of companies

The list of companies for this analysis is a combination of the following lists

- spin-off company list - managed by staff in Cambridge Enterprise
- University Challenge Fund (UCF) and University Venture Fund funded companies when these are not already in the ‘spin-out’ list – managed by staff in UCF
- start-up company list – managed by staff in the Institute of Manufacturing

This combined list of companies has about 310 members of which about 250 are still trading (either on their own or as a result of an acquisition or merger). This list will be called ‘The University of Cambridge New Business Ventures’ and a copy is shown in Appendix 2. The numbers of companies resulting from each category are:

- 42 spin-off companies (in yellow)
- 19 investment companies – not in the start-up list (in blue)
- 249 start-up companies

The University of Cambridge New Business Ventures list will show the name of the company, its current status (ie whether it is still trading; has ceased trading – in red – or has been acquired) the year (approx) that the company was founded, the University Department(s) from which the knowledge base came, and the company web-site (if known). More detailed information will not be provided on any business in order to preserve the confidentiality under which the data was collected.

Data collection

Each company on the University of Cambridge New Business Ventures list was sent a letter and questionnaire asking six simple questions. The aim is to poll each company each year with the same questions and therefore build a picture of the changes and trends in University of Cambridge new venture formation and success levels. A copy of the letter and questionnaire is shown in Appendix 2. The six questions asked are:

Sales (or turnover) for past year:

Profit (or loss) for past year:

Number of employees at year end:
(or full time equivalents if more appropriate)

Investment funding during past year:

Estimate of current valuation of the business

Mergers or acquisitions during past year:

When obtained, this information has been collated into a spreadsheet. There is an agreement that all company specific information that is provided will be held in confidence and will not be disclosed where it relates to a specific company or where it may lead to company specific data being deduced.

It has proven difficult to get a 100% response from the companies to the questionnaire. At the time of analysis responses have been received from 172 companies and it is on the basis of these responses that the analyses below have been carried-out and results determined. Financial data has been supported by collecting information from Companies House where possible. It is considered that this level and number of responses received (about 70% of the companies still trading) will enable the analysis and results to be representative and relevant. In future years it is hoped that a higher level of response will be achieved and this will make the results even more precise.

Analysis

Information has been collected from 172 of the new businesses created from the University of Cambridge. The results are shown as aggregate numbers for each of the principal questions that were asked and the figures shown are the additive figures for all the companies for which data has been collected. The results are based on replies received and additional financial information obtained from Companies House; no estimate or inclusion has been made for the data from the companies that did not reply to the survey although the figures from these companies would certainly increase the size of the results. The financial data below is for the last year of financial reporting. It is

anticipated that in future years an even higher percentage of businesses will respond with their financial information.

Results for University of Cambridge New Business Ventures – all sectors

Number of Companies		172
Annual Revenue	£	880 million
Annual Profits	£	92 million
Annual Losses	£	108 million
Valuation	£	4,170 million
Number of Employees		8,857

These figures can be broken down by the principal business sectors:

Results for the IT Hardware Sector

Number of Companies		28
Annual Revenue	£	327 million
Annual Profits	£	43 million
Annual Losses	£	28 million
Valuation	£	1,835 million
Number of Employees		1,802

Results for the IT Software Sector

Number of Companies		39
Annual Revenue	£	105 million
Annual Profits	£	7.9 million
Annual Losses	£	18.8 million
Valuation	£	598 million
Number of Employees		850

Results for Life Science Sector

Number of Companies		47
Annual Revenue	£	37.5 million
Annual Profits	£	4.1 million
Annual Losses	£	53.1 million
Valuation	£	915 million
Number of Employees		1259

Results for Other Sector

Number of Companies		58
Annual Revenue	£	410.5 million
Annual Profits	£	37 million
Annual Losses	£	8.1 million
Valuation	£	822 million
Number of Employees		4,946

These analyses show that the IT hardware sector is the largest group of new ventures created from the University of Cambridge according to the financial criteria measured. Life science is the next largest sector in terms of valuation although the levels of revenues and profits are much lower than the IT sectors. The sector with the largest level of employment is the 'others' sector; this includes all the other types of companies, such as engineering, consultancy, consumer products, etc, that were created from the University. The data in this sector are also skewed somewhat by the University related companies that were founded earliest and are the largest employers: Cambridge University Press (employing 1,328 people) and UCLES (the University local examination syndicate; employing 1,679 people).

Of the 312 companies that have been identified in the database, 54 have been identified as having 'ceased trading'. This represents a failure rate of about 17.5% which is very low for typical high technology company creation and may be the result of the number of variables such as:

- the calibre of the underlying technology
- the strengths of the business teams
- the support and assistance of local incubation processes
- the large number of businesses created in recent years that have not had time to fail yet
- are 'lifestyle companies' that do not plan to grow fast or take risks

The causes of success and failure of University of Cambridge created new ventures would be a fruitful subject for further research in the future.

The date of starting the business has been identified for 254 of the companies and these show the following distribution:

Until 1980	10	companies
1980 – end 1989	17	companies
1990 - end 1999	107	companies
2000 – 2005	120	companies

These data indicate that there is an increase in the number of companies being established or that the information on these companies is easier to collect.

Conclusions

The principal conclusion from this study is that the new business ventures created that were based on University of Cambridge knowledge, skills and training adds a very significant level of wealth to the UK economy and also to the local Cambridge economy. It may be assumed that these companies also make a considerable contribution to the employment locally and nationally (although no split has been made between the employment in the UK and the employment that may occur overseas in these companies). Furthermore, the analysis indicates a considerable benefit to the exchequer arising from taxes to these companies and, more significantly, on the individual employees who will be paying income tax.

These figures give an indication of the level of benefit that has been received by the national and local economy from the business creation activities of the University of Cambridge but they do not show the level of benefit that has been received by the University itself. The University of Cambridge gains in a number of ways from the success of its new business ventures but many of these are indirect such as increased publicity and recognition.

The University will gain direct benefit from spin-offs and start-ups when it owns shares in those companies and there is a liquidity event that enables the University to sell the shares. This is only likely to happen when a new business venture has grown to a significant size and this usually takes some considerable period of time: to date such revenue realisation instances have occurred only once or twice. A further benefit to the University is that of endowments from wealthy alumni who have made their fortune from

their spin-off or start-up company: this is likely to take even longer than equity realisation. However, the potential is for the University to gain significantly from this resource if managed correctly: in the US it has proven to be the most significant sources of funding for the major research led universities.