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Technium Pan-Wales: Impact  
Assessment

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# **Technium Pan-Wales Impact Assessment**

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## **About this Document**

The purpose of this document is to present the findings of an investigation into the impacts and returns provided to Wales by the investment made in the Technium Centres established across the country.

## **Acknowledgements**

This report has been prepared using methodology and technical expertise provided by the Institute for Policy and Economic Development (IPED) at the University of Texas at El Paso. IPED is a leading centre in analysis of public policy and impact assessments of this nature.

The authors would like to thank the managers of the Technium Centres, the Welsh Assembly Government's Department for Enterprise, Innovation and Networks (DEIN), the University of Wales Swansea and the other organisations and individuals who have provided data, material and assistance in the development of this report.

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## **Executive Summary**

### **This Report**

- This report presents the findings of an investigation into the return on investment and impact of the Technium initiative upon the Welsh economy.
- It is acknowledged that Technium is a long-term initiative and its true value impact will be seen in the future. As Technium is still in its infancy, and some Centres are not yet operational or have only just opened, it is challenging to evaluate the initiative. This study therefore focuses on the benefits provided during the 2000-2008 inception phase of the initiative.
- The study focuses on the following;
  - Employment Impact (Jobs) – presenting the impact of employment within the Centres and investigating the employment supported by this activity in the wider community
  - Employment Impact (Economic) – quantifying the value of the direct, indirect and induced employment created via Technium
  - Construction Impact – examining the value of the economic development infrastructure created and the employment impact of the construction phase of the initiative
  - Rental Income – investigating the internal returns created by the initiative which serve to offset some of the upfront costs of investment
- The study provides three models, 'base', 'conservative' and 'optimistic', to present impacts where values are sensitive to particular assumptions or variables.

### **Technium**

- Technium is a network of inter-related business development centres supporting the growth of indigenous and inward investing knowledge-based businesses in a range of industry sectors across Wales.
- The purpose of Technium is to provide an environment that supports growing knowledge-based businesses by providing specialist support and facilities, along with links to academic expertise
- The individual Centres represent partnerships involving the Welsh Assembly Government, local Higher Education Institutions (HEIs), the private sector, Unitary Authorities and other stakeholders.

## Findings

- The report presents findings relating to the impacts described. Presented below are findings for the 'base' model used which, together with the other models, is discussed in more detail in the body of the document
- Direct Employment
  - Technium has created some direct 558 jobs to date, a figure that is projected to rise to 1,297 by end 2008.
  - The value of this direct employment is some £73.8m and will be worth some £208.3m by end 2008.
- Indirect and Induced Employment
  - The initiative indirectly supports employment equal to a further 295 jobs in the wider community
  - By 2008, the employment supported would equal 762 jobs
  - This employment equates to £62.6m of economic impact
- Construction Impact
  - The combined value of the Centres represents a total of £45.2m of economic development infrastructure
  - The economic impact of employment during the construction phase was worth an additional £29.6m to the community.
- Rental Income
  - Rental income has returned £2.3m to the initiative to date and will have had an impact of over £6m by 2008.
- Combined Impact
  - Combining the impacts described above gives Technium a net present value of £163.66m and a benefit/cost ratio of 2.71 representing a significant return on investment.
  - As this impact does not include the future returns of the Technium initiative, this would suggest that Technium has already provided a considerable return to the Welsh economy and has provided a cost-effective and strong foundation to support growth of the Knowledge Economy in Wales.

# 1. Introduction

## 1.1 Technium – The Concept

The Technium initiative is a cornerstone of the Welsh Assembly Government’s efforts to nurture the development of the Knowledge Economy in Wales. The changing global economy and pressures upon traditional sectors such as coal, steel and more recently manufacturing have posed great challenges for the Welsh economy. The growing importance of the creation and exploitation of knowledge to fuel innovation is critical to future economic growth and features as a central plank in the Welsh Assembly Government’s strategy for the economic future of Wales.

Though Wales has a number of major employers, it is primarily an SME economy with relatively few companies actively engaged in the most intensive levels of innovation. Therefore to develop a vibrant Knowledge Economy this foundation requires development, including the creation and nurturing of indigenous knowledge enterprise and attraction of inward knowledge-based investment.

Technium is a network of inter-related business support centres where innovative companies can reach their full potential in a supportive environment. The Technium initiative started at the end of the Objective 2 funding period in 1999 and has since evolved into a network of Centres across the principality.

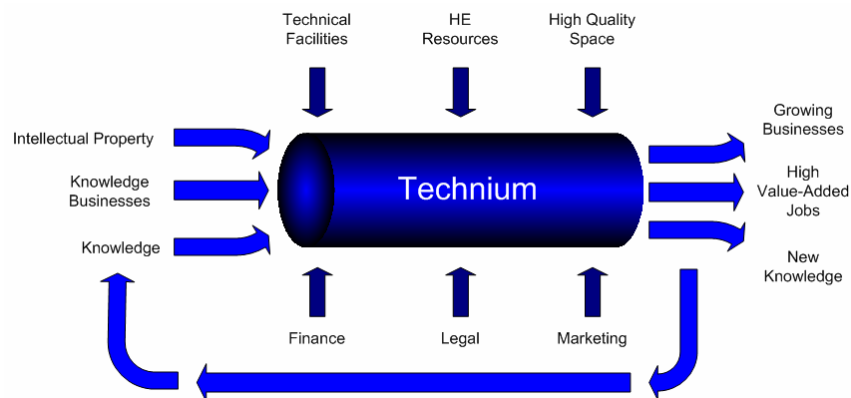


Fig. 1 - The Technium Concept  
(Used courtesy of the University of Wales Swansea)

The foci of Technium are the Centres, many of which provide support to specific sectors. The overarching concept is to nurture knowledge businesses in an environment with support for the whole process of innovation and business development including finance, legal and marketing support together with specialist technical facilities and other resources. Once businesses have been nurtured in Technium they are then assisted to ‘graduate’ and embed themselves in the region to continue their growth. The Technium Centres are described in more detail in the following sections.

Technium is not, however, a start-up incubator designed solely for spin-outs from the Higher Education Institutions (HEI)s of the North and South West of Wales. Rather, it takes on a broader role that is reflected in the mission statement;

*"To assist in the incubation and continued development of the Knowledge Economy in the region".*

While there are indeed many start-ups in the Centres, some of which originated in one form or another from the HEIs, the Centres are home to a mix of companies including inward investors in various sectors from a range of countries.

In the Welsh Assembly Government's Strategic Framework for Economic Development, Wales: A Vibrant Economy the role of Technium is reinforced as being;

*"...to support innovation in firms and encourage stronger links with higher education..."*

Wales: A Vibrant Economy 2005

This is also reflected in the regional charge given to Technium via the Welsh Assembly Government's Wales Spatial Plan;

*"...the University, FE Colleges and [Technium Centres] should embed the Knowledge Economy within the area..."*

Wales Spatial Plan 2004

While Technium is a long-term investment in the development of the Welsh Knowledge Economy, it has already received much interest in its operations and effect on Wales from academic, governmental and other bodies.

Examples include the Mid-Term Evaluation of the Objective 1 Programme for West Wales and the Valleys, numerous academic reports and the recent study from Cardiff University, commissioned by BBC Wales, examining the use of Objective 1 funding in Wales.

These and other reports (including this one) make clear though that Technium is an evolving initiative and more needs to be done to fully understand its impact upon Wales. The authors hope that this study provides a useful step in achieving this understanding.

## 1.2 Technium – A Brief History

Since the first Technium Centre was established at Swansea Docks, partners of which include the former Welsh Development Agency (WDA) and the University of Wales Swansea, other Centres have been developed across Wales. These include Centres at St Asaph and Bangor in the North, reaching across to Aberystwyth on the west coast and further Centres can be found in Pembroke Dock, Carmarthenshire and Neath Port Talbot. The Centres included in this study are (in broadly chronological order):

- Technium Swansea
- Technium Digital
- Technium OpTIC
- Technium CAST (Centre for Advanced Software Technology)
- Technium Aberystwyth
- Technium Sustainable Technologies
- Technium Performance Engineering
- Technium Pembrokeshire

The following sections provide a brief overview of these Centres.

### 1.2.1 Technium Swansea



Technium Swansea comprises of an initial Centre which opened in 2001 and grow-on space which opened in 2003. These combine to provide 30 units for tenants and co-locate DEIN business support staff that provide services to these and other Centres in the region. The grow-on space provides assistance for companies in the smaller units (of both Technium Swansea and other Centres) to develop while remaining within the incubation infrastructure. Key partners in the initiative include Morgan Cole and PriceWaterHouseCoopers.

### 1.2.2 Technium Digital, Swansea University and Bridgend



Established in 2003 on the Swansea University campus and with a satellite operation at the SONY factory in Pencoed, Technium Digital co-locates University research, specialist laboratories and 13 incubator units. The SONY satellite Centre offers further incubation capacity together with specialist facilities including test and measurement, product development and manufacturing. The Centre links closely with departments in the University including Electrical and Electronic Engineering, Research and Innovation and the newly formed Institute of Advanced Telecommunications. Key industrial partners include Sony, Mitel, Cisco, 3M and IBM.

### 1.2.3 Technium OpTIC



Based at St Asaph, Technium OpTIC was established in 2004 as a partnership between the Welsh Assembly Government and the Welsh Opto-electronics forum. The Centre was developed to build upon existing regional strengths within the Opto-electronics sector and it houses 24 incubation units along with specialist facilities, including clean room facilities, as part of a technology Centre. The Centre has a dedicated business support unit to assist in the development of new products and processes, including access to expertise from the National Centre for Ultra-Precision Surfaces which is located at the Centre.

### 1.2.4 Technium CAST



Technium CAST (Centre for Advanced Software Technologies) provides a focus on high performance computing applications. Located in Bangor, the Centre comprises business incubation facilities and a 'Software Hotel' which offers flexibility in space available to companies. Facilities include a 3D visualisation suite while a research team based on-site to help companies in the development of new products and services.

### 1.2.5 Technium Aberystwyth



Grassland and Environmental Research (IGER).

Located at Aberystwyth on the west Coast of Mid-Wales, the Centre does not have a specific sector focus but supports all manner of technology businesses within the region. It offers incubation units and hot desk facilities for 10 to 12 companies. Partners include the Welsh Assembly Government, the Universities at Aberystwyth and Lampeter and the Institute of

### 1.2.6 Technium Sustainable Technologies



Research and Innovation. Industrial partners include 3M, BP and GE.

Technium Sustainable Technologies opened in 2005 and is designed to support a wide range of companies from sectors including recycling, sustainable energy, advanced materials. Based at the former BP site in Baglan, the Centre offers incubation units co-located with specialist research expertise that is supported by Schools and Departments of the University of Wales Swansea including Engineering, Business and

### 1.2.7 Technium Performance Engineering



Recently completed in Dafen, Carmarthenshire, Technium Performance Engineering focuses upon the Automotive and Aerospace sectors. Housing 15 incubator units, the Centre accommodates specialist facilities including a Product Lifecycle Management development facility and is supported by research expertise from the School of Engineering and the Department of Research and Innovation at the University of Wales Swansea. Industrial partners include the British Automotive Racing Club, the Welsh Automotive Forum and IBM.

### 1.2.8 Technium Pembrokeshire



Technium Pembrokeshire, the most recent addition to the network, is situated at Cleddau Bridge Industrial Park and has a focus on support of the Energy sector in the region. Incubator units are complemented by grow-on space to help anchor growing businesses within the locality. The Centre works closely with departments of the University of Wales Swansea including close interaction with the Power Electronics Research Group of the Department

of Electrical and Electronic Engineering and the Environmental Law Group of the School of Law.

## 2. The Analysis - Methodology

This analysis is provided by the Institute for Policy and Economic Development (IPED) at the University of Texas at El Paso. IPED was invited to study Technium by the University of Wales Swansea, who facilitated data collection amongst the Centres. The following sections describe the impacts investigated and approach adopted.

### Impacts

It is well understood and appreciated that the meaningful benefits of initiatives such as science parks and business incubators come some time after their inception. However, this analysis attempts to investigate some of the short-term impacts of Technium and what it has helped put back into the Welsh economy. Ultimately, the greatest benefits to Wales will come from the successes of companies that graduate from the Technium Centres.

While Technium is a long-term initiative, this study aims to give an overview of certain impacts of the Technium initiative and attempts to quantify what has already been returned to the region, namely;

- Direct Employment Impact
- Indirect and Induced Employment and Wage Impact
- Centre Construction – Assets
- Centre Construction – Employment
- Rental Income

This analysis makes use of historical data (to the end of 2006) collected from the initiative together with projections based upon past performance and projections provided by the individual Centre managers. The analysis considers the impact of the initiative during the period 2000-2008, taking the end 2006/start 2007 as 'present', where figures and values are expressed in 'present values'. The analysis has been carried out in line with the relevant guidance of the HM Treasury 'Green Book', which provides the benchmark for evaluating public projects such as Technium.

### Models

Analysis of certain impacts described above is reliant upon externalities and is sensitive to variation in factors such as multipliers used to assess indirect impacts and the valuation of assets. Therefore in this examination three models have been used to present a sensitivity analysis of the combined impacts.

A '**conservative model**' assumes very low multipliers and most modest valuation of assets. An '**optimistic model**' applies higher multiplier values and higher asset valuations. Together, these models present the lower and upper extremes of the impact of Technium. These are accompanied by a '**base model**' that uses average values between the two extremes to present, and is intended to be the most representative representation of the actual impacts.

In all cases the impacts are presented against the full investment adjusted to current prices (see notes in section 2.7). This approach of presenting a combined sensitivity analysis with optimistic and pessimistic values for certain variables is suggested by the European Commission<sup>1</sup>. The study of these impacts is described in more detail in the following sections.

## **2.1 Direct Employment Impact**

The primary impact of Technium is in the employment that it helps generate in the community. Some of this impact will leak beyond the Wales, much in the form of taxation (that will return from central government to the Welsh Assembly Government) and otherwise. This is difficult to quantify without extensive surveying of individual employees. While this level of detail is not available to this study, previous surveys have calculated average remuneration amongst Technium companies. Therefore, for the purposes of this study, gross employment costs alone will be considered.

Furthermore, it should be noted that the future envisaged benefits of Technium are contained within companies that graduate from the Centres. While future growth of these companies will be due to factors beyond their roots in Technium, it can be argued that much of this growth would not have occurred within Wales had Technium not been there at their inception. For the purposes of this study employment in graduated companies is retained as a Technium benefit, but not any post-graduation employment growth.

## **2.2 Indirect and Induced Employment and Wage Impact**

The direct employment within Technium and its companies is a clear benefit of the initiative and relatively straightforward to assess. However, these companies and their employees are but part of the wider community and economy in which they reside. It is upon this wider economy that the impact is made, supporting further employment beyond the Centres through 'multiplier' effects. As these jobs may be in a wide range of sectors and some expenditure inevitably permeates outside Wales it is more challenging to quantify than the direct impacts.

Determining the magnitude of this multiplier effect depends on the types and sizes of expenditure made by individuals (e.g. how much is spent on local fish and chips, what groceries are bought and where, foreign holidays etc.), the region within which the multiplier is being considered (e.g. Wales, UK, EU) and other factors. As Technium is an initiative that aims to impact within Wales this is the region considered in this analysis.

Determining an appropriate multiplier is challenging, as Technium is home to companies at different stages of their lifecycle in a wide range sectors that employ people at varying salaries in a variety of roles. Furthermore, the Centres are spread over a wide geography which, coupled with the fact that the companies are growing and moving out into the community makes the impact of Technium is particularly dynamic.

Therefore for the purposes of this study three models are presented. These apply employment multipliers that represent the range of values for sectors of the Welsh economy defined in works including that of the Welsh Economy Research Group (WERU). These range from 1.29 in the Textiles and Clothing sector to 2.32 for Oil and Chemicals<sup>ii</sup>. Some studies have suggested that multiplier effects for science parks and incubators are higher<sup>iii, iv</sup>, however some of these values were calculated during the technology boom at the beginning of the century and in different regions under dissimilar circumstances. Therefore, for this analysis the more reserved range described below will be applied.

The first 'base' model assumes a multiplier of 1.5, supposing that each Technium job supports 0.5 further jobs in the community, which is typical amongst various sectors of the Welsh economy (see Appendix Table:5 typical employment multipliers). At the lower extreme of the analysis, the 'conservative' model applies a relatively low multiplier of 1.25. The second 'optimistic' model assumes a multiplier of 1.75, supposing each Technium job supports 0.75 further jobs in the community.

The reason for this approach is to simply present a range of values for the impact of Technium, where the impact would likely fall within the range presented.

### **2.3 Centre Construction – Assets**

While the focus of the Technium initiative is to develop knowledge businesses in the region, it also delivers a set of valuable assets to the region; the Centres themselves. Though sale of the Centres is not the intention of the partners involved in the initiative, they are not a sunk cost but a clear asset that can continue to deliver benefits into the future.

Furthermore, consideration of the residual value of a project as an inflow at its 'end' is a practice required by the European Commission in analysis of the cost-benefit of ERDF projects, including explicit reference to buildings. Few of the Centres have reached the end of the ERDF project phase and Technium as a whole is an ongoing long-term initiative, rather than a one-off flash in the pan project. Therefore, it is not possible to take this 'end' of project approach.

Valuation of commercial property is a complex science (and art) and much depends on the building usage, its location and other market factors etc. in order to determine an appropriate yield. The HM Treasury Green Book describes how the value of capital assets such as land and buildings should be included as that considered as Market Value (MV), as ascertained by someone appropriately qualified, such as an accredited member of RICS.

For the purpose of this survey it has not been possible to develop individual valuations of each Centre. Furthermore, as each of the Centres is located in an evolving environment and market with its own unique circumstances the consideration of 'base', 'conservative' and 'optimistic' models has been adopted.

The 'base' model assumes that the residual value of the Centres is 75% of their construction cost. The 'conservative' model values all Centres (including those in the SA1 area) at 50% of their construction cost, while the 'optimistic' model values the buildings at their full construction cost. In each case the value of the land was included at full market value, for it formed part of the match funding. Furthermore, the use of three models allows any variation in depreciation or growth in value of the buildings to be combined.

### **2.4 Centre Construction – Employment**

Along with the value of the assets created by the initiative, the construction phase also has an impact in creating and supporting jobs directly and indirectly in the community. While these impacts are fixed in duration they do in themselves represent a significant return to the region. As well as quantifying labour used on site the study has also investigated the professional services aspects of the projects.

Furthermore, as with consideration of the Technium company jobs, the construction phase also results in a multiplier effect (though for the same fixed period).

These have been calculated in the same manner as for the company employment impacts, using 'base', 'conservative' and 'optimistic' models to present the impacts, applying multiplier values of 1.25, 1.5 and 1.75 respectively to model indirect and induced impacts. As the jobs involved in the construction phase differ to those in Technium companies a separate average salary was calculated in assessing this phase of the project. Data for this part of the analysis was provided by the lead contractors for the Centres and from the project managers overseeing the construction for the lead sponsoring organisation.

## **2.4 Rental Income**

While investment is made into the establishment and running of the Centres there are revenues generated including rental income that contributes to their costs. It is understood that service charges cover facilities management and other associated costs while the rental income is put towards the other costs. As the buildings occupancies increase the rental income will increase proportionately. To date these incomes have developed in line with both inflation and occupancy. Rental rates vary slightly between Centres, therefore a typical average rate in any year has been used for projections.

## **2.5 Alternative Investment**

it is difficult to develop a base-line against which to reflect and contrast the performance of Technium without having access to the options for other potential investments considered by WEFO, the Welsh Assembly Government and other partners when considering investment in the Technium initiative. Typical 'cost per job' benchmarks are unsuitable for this type of comparison as the Technium job creation is designed to be dynamic and ongoing. Such figures are generally associated with investments resulting in one-off job creations and should be considered in the context including the type of investment, the outputs, time horizon etc.

## 2.6 Notes

When considering the impact of an initiative such as Technium it is important to consider a range of factors including certain technical issues. These include deadweight, additionality and displacement. In essence these refer to a benefit that would have occurred and is the intervention precluding another benefit from being realised. A study of this nature is unable to analyse these issues to the greatest detail but does give consideration as follows:

**Deadweight and Additionality** – It is often difficult to assess whether benefits would have occurred naturally, and to what extent. However, prior to Technium it was identified that there was a lack of suitable infrastructure for business incubation which reduces the likelihood of the benefits having been realised otherwise. This is supported by the initial findings of a survey amongst Technium companies and individuals that reports that without Technium nearly all of the companies would have been established or developed outside of Wales, if at all. For initiatives of this nature additionality has been shown to be high and in the order of 70%-80+%, though as it is generally considered at a survey level it has not been factored into this study<sup>v</sup>.

**Displacement** – While it is practically impossible to determine for example whether another Welsh company would have enjoyed the custom taken by a Technium company, it is possible to give consideration to displacement. Preliminary evidence from a survey of Technium companies show a high proportion of trade by Technium companies is done internationally which makes competition with other Welsh companies less likely. Furthermore, the hi-technology nature of companies within Technium aiming to exploit individual niche markets works against the likelihood of displacement. As described above for additionality displacement in such endeavours has been found to be relatively low, in the order of ~ 10%. Again as this would require a wider analysis than that covered in this study it has not been factored in during the preparation of this report.

**Current Pricing and Discounting** – The cost of investment and value of benefits derived have been adjusted to current (2006) prices using factors provided by HM Treasury. The general GDP Deflator has been applied as this encompasses a range of indices beyond the consumer of either the Retail Price Index (RPI) or the Consumer Price Index (CPI). Furthermore, the values of costs and benefits have also been discounted to adjust for the different times at which benefits occur. The discount rate applied is the 3.5% Social Time Preference Rate (STPR). This is in line with guidance for appraisal and evaluation provided in the HM Treasury Green Book<sup>vi</sup>.

### **3. The Analysis - Findings**

#### **3.1 Direct Employment Impact**

Two centres (Performance Engineering and Pembrokeshire) have only just been completed, while others are still in the early stages of their operation and development (OptIC, CAST and Sustainable Technologies). However, there already exists in the established and operational Centres a significant amount of employment. This currently stands at 558 jobs including 526 people in companies themselves with another 32 in support roles including business support, technology support, facilities management, receptionists etc. (though not counting graduated companies).

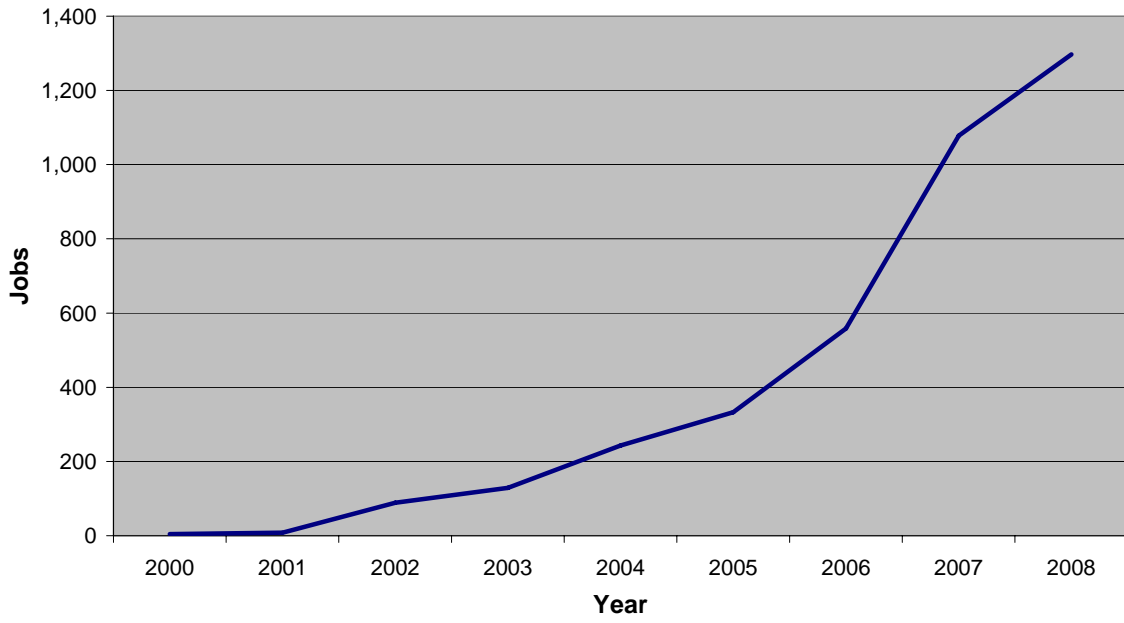
As the Centres mentioned above become fully operational it is projected that employment will continue to increase rising to a total of 1,297 jobs in 2008 as shown in fig. 2 on the following page.

This employment is projected to increase as the recently opened Technium Sustainable Technologies Centre gains momentum and the Technium Performance Engineering and Technium Pembrokeshire Centres become operational as presented in the figure below and Table 1 of the Appendices.

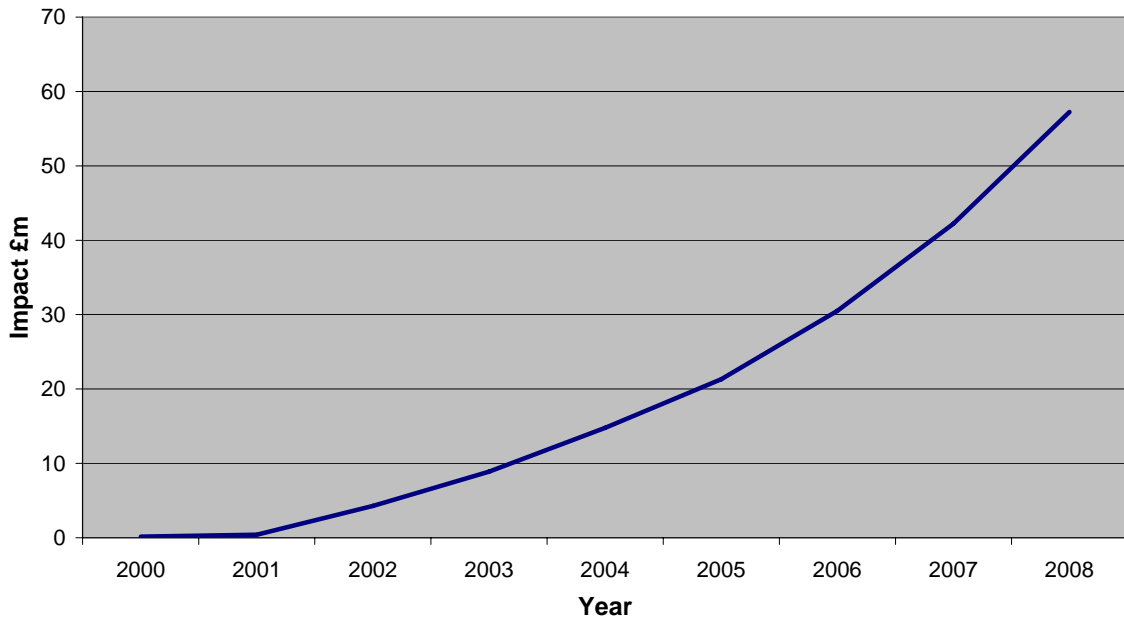
While Technium itself (and most of its companies) are at most in their infancy, there are already instances of companies moving on from incubation into the wider community. To date this has seen 32 jobs graduate out of the Centres into the region and this figure is set to grow with a number of companies poised to graduate during the next few years.

Surveys of Technium companies have allowed average salaries within Technium companies and their support to be base-lined during 2003 and 2006. Applying this data to the historic and projected employment performances, it can be calculated that the direct wage impact of £73.8million by 2006 and £208.3million by 2008 (as shown in fig. 3 on the following page).

**Figure 2: Direct Employment - Job Numbers**



**Figure 3: Direct Jobs Employment and Wages Impact**



### **3.2 Indirect and Induced Employment and Wage Impact**

As described in the methodology section the indirect and induced impacts of Technium have been appraised using 'conservative' and 'optimistic' models.

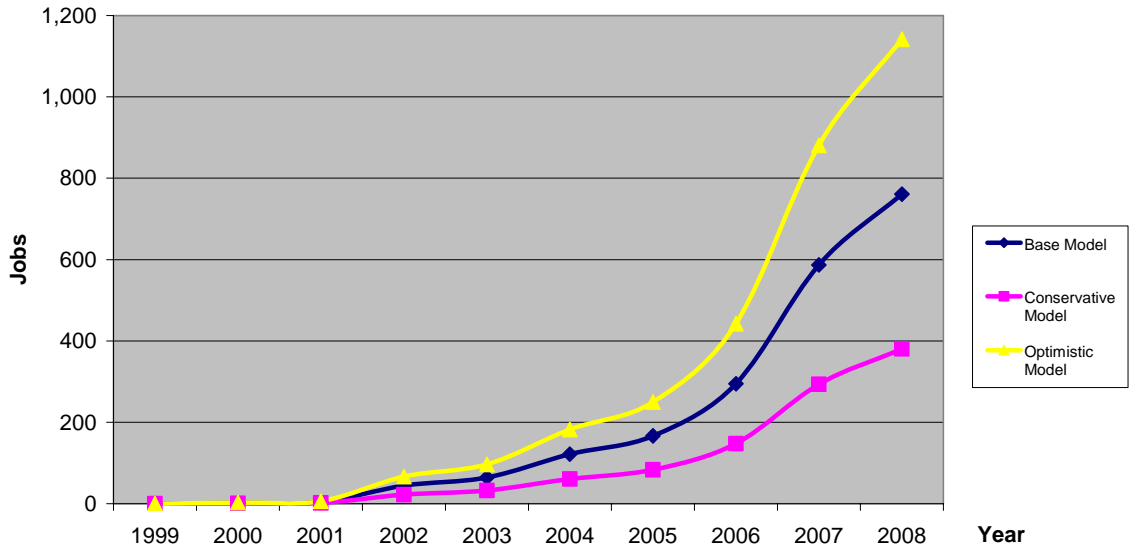
The 'base' model (1.5 multiplier) suggests that a further 295 jobs are currently supported in the community. This would be projected to grow to 762 by 2008. This represents a significant amount of employment and an important contribution to the economy.

Using the 'conservative' model (1.25 multiplier) would suggest that a further 148 jobs are currently supported in the community, which would grow to 380 by 2008. This employment, though dispersed throughout the economy as a whole, if embodied in a single enterprise would in itself represent a notable employer. Furthermore, with the continued growth and graduation of Technium companies and the addition of further Centres this is projected to grow further.

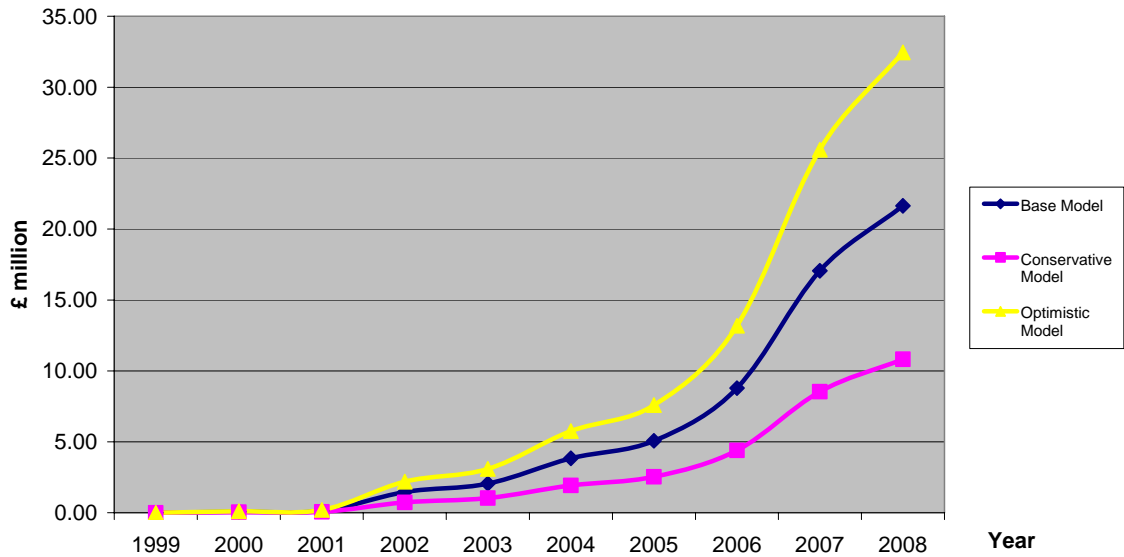
The 'optimistic' model (applying a 1.75 multiplier) suggests an increased number of further jobs in the community, which at present would stand at 443 jobs. This if grouped together, is equivalent to a large employer in the region. Consideration of the projected growth of the Technium initiative through other Centres becoming operational as above would result in 1142 jobs being supported in the community by 2008.

As for the direct employment it is possible to give this a monetary value based on average wages. The value of this impact using 'base', 'conservative' and 'optimistic' models is calculated as being £62.6m, £31.3m and £93.9m respectively by 2008.

**Figure 4: Indirect Employment supported by Technium - Job Numbers**



**Figure 5: Indirect Employment Annual Economic Contribution**



### **3.3 Centre Construction – Assets**

#### **Technium 1**

The construction of the first 'Technium', was completed in 2001 at a cost of £2.2million. Providing 17 units for companies, the Centre overlooks the River Tawe and has been visited by dignitaries including Prime Minister Tony Blair and former President of the European Commission Romano Prodi. Developed in the rather dilapidated docks area of the city, the Centre has now become a cornerstone of the SA1 development. Soon after its opening further development started in the area including the Morgan Cole office development.

#### **Technium 2 and Technium Digital**

The next two Centres to be developed were Technium Digital and Technium 2 (which is the second phase of Technium Swansea) that were completed in 2003 and opened in 2004. Technium 'Digital' based on the Swansea University campus at a cost of £4.6million houses laboratories and researchers on the ground floor, technology transfer and other functions on the first floor and incubation, virtual reality and conference facilities on the upper floors. The Centre was joined by the satellite facility at the SONY Pencoed factory, developed at a cost of £0.5million (however, for this study these capital costs are included in the overall costs, though as this facility is embedded in the Pencoed plant no value has been included here as a residual asset).

Technium '2' was developed at the same time as Technium Digital, opening slightly afterwards and represents the second phase of Technium Swansea. Larger than the initial Technium 1 and built at a cost of £4million, the Centre houses larger units and includes an underground car park. Since its opening the SA1 development has progressed and the Centre is now being joined by various residential, office and other commercial developments.

#### **Technium OptIC, Technium CAST and Technium Aberystwyth**

Following the development of Technium in the South West of Wales other Centres were developed in Mid and North Wales. In 2003, Technium OpTic was the first of these to open at a cost of £7m providing business development units along with specialist facilities and expertise for the Opto-electronics sector.

At the same time, Technium Aberystwyth was under development. Unlike the other Centres which are all new builds, the Centre in Aberystwyth was a redevelopment of an existing building. In this analysis the purchase price of the building of £1.78m is considered as the asset value while the costs of redevelopment alone are used in the construction employment impact. There will of course have been benefit to the local community in the construction of the original building, though these are not included in this analysis.

Technium CAST is the second of the buildings to be constructed in North Wales at a cost of £10.7m. Operational since 2004 the Centre comprises the incubation space as well as a 'software hotel' providing flexible space within which companies can develop.

### **Technium Sustainable Technologies**

The most recently opened Centre is Technium Sustainable Technologies. Located in the former BP site at Baglan Energy Park, the Centre is larger than prior Centres, costing £6.6million and housing 30 incubator units, many of which are larger than those elsewhere, such as Technium Digital.

### **Technium Performance Engineering and Technium Pembrokeshire**

The two remaining Centres which are due to open are Technium Performance Engineering (formerly conceived during initial planning as 'Auto Technium') and Technium Pembrokeshire. Both Centres are significant investments of £5.2million and £10.5million respectively. In the case of Technium Pembrokeshire it should be borne in mind that this investment relates not only to the central building but also additional surrounding facilities for grow-on space and other activities.

### **Combined Centre Values**

The 'base' model suggests a £45.3m value for the Centres. In the case of the 'conservative' model the total value of the Centres is £30.2million. Even with the conservative assumptions made this still represents a sizable sum to consider. The 'optimistic' model on the other hand culminates with asset value of £60.4million, which is more than either the non-Objective One investment of £31.6million or the Objective One investment of £22.5million (also following inflation and STPR adjustment).

However, the Technium initiative is not a European Union subsidized property development scheme and these assets are perhaps best considered as offsets against costs rather than themselves as returns.

### 3.4 Centre Construction – Employment

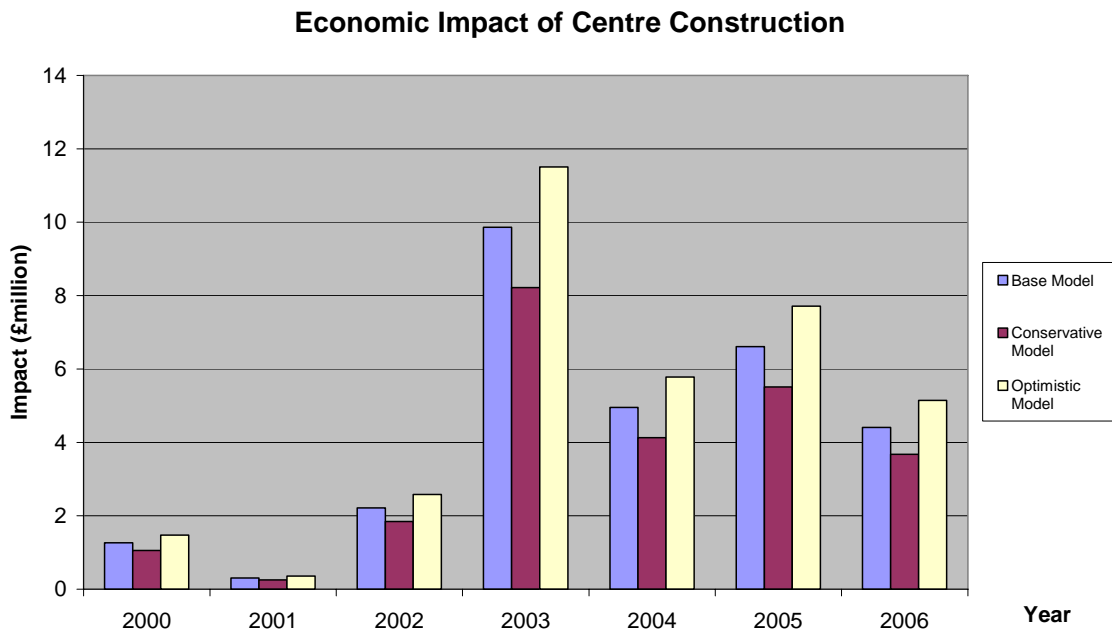
Research has shown that a high proportion of labour used (90%) in construction of the Centres was sourced locally. This was found to be the case for both the labour and professional services used in the constructions.

While the number of people working on any project varies as it progresses there were on average 31.72 people, of whom 28.55 were local to a Centre, employed in the construction of the Centres.

The same approach of using 'base', 'conservative' and 'optimistic' models as applied in the evaluation of Technium company employment was used in considering the impact of the construction phase. This assumed the same multipliers of 1.25, 1.5 and 1.75. In each model the impact was only quantified for the 'local' workers, assuming that any other impact was made outside of Wales. The 'base' multiplier of 1.5 is close to that of the construction industry as a whole presented in table 5 of the Appendices where the employment multiplier = 1.43 and the GDP multiplier = 1.70.

Using average wages from the construction projects provided by the lead contractors and project managers of the project, it is possible to quantify direct, indirect and induced impacts as performed for the direct, indirect and induced employment impacts for the Technium companies. For the three 'base', 'conservative' and 'optimistic' models this culminates in impacts of £29.6m, £24.7m and £34.5m respectively.

Presented on the following page are the employment and wage impacts, direct, indirect and induced impacts of the construction phase in each year of the construction of the Centres according to the 'base', 'conservative' and 'optimistic' models.



### **3.5 Rental Income**

Technium Performance Engineering and Technium Pembrokeshire have only just been completed so have not yet generated rental income, while other Centres such as Technium Sustainable Technologies, Technium OpTIC and Technium CAST remain relatively young, so incomes generated by these are relatively modest. However, adjusting for occupancy it can be calculated that during 2006 rental income per employee in the network equated to approximately £1,681 per year.

Using this benchmark with historic data and occupancy projections together with adjustments for inflation and the 3.5% STPR the impact of rental income has been calculated as £2.3m to date, projected to rise to £6.1m by 2008.

### 3.6 Combined Impact

Previous sections have described individual benefits arising in 'optimistic' and 'conservative' models. Combining these provides a clearer picture to compare against the investment made. However, it should be remembered that this simply adds together the benefits described and while it includes the whole costs of the initiative it does not attempt to provide a quantification of all the benefits returned by Technium. This would require further research such as valuation of the Technium companies themselves, measure of spill-over and other effects, which are beyond the scope and resources of this indicative study.

Presented below are the costs and impacts described in the previous section in present values. It can be seen that in all three scenarios, 'base', 'conservative' and 'optimistic' the Net Present Value of Technium is positive and greatly exceeds £100m. Furthermore, the Benefit/Cost (B/C) ratio, which relates the returns to the size of the investment, for all three scenarios is greater than 2. This suggests that the initiative is therefore providing a significant return and making a positive impact relative to the investment made.

<b>Impact (Present Values)</b>	<b>Model</b>	<b>Base (£,000s)</b>	<b>Conservative (£,000s)</b>	<b>Optimistic (£,000s)</b>
Company Employment and Wages (Direct, Indirect and Induced)		178,276	148,223	208,329
Construction Phase Employment and Wages (Direct, Indirect and Induced)		29,613	26,678	34,549
Residual Assets (Centre Values)		45,329	30,220	60,439
Rental Income		6,106	6,106	6,106
<b>Costs (Present Values)</b>		95,670	95,670	95,670
<b>Net Present Value (NPV)</b>		<b>163,656</b>	<b>113,557</b>	<b>198,645</b>
<b>B/C Ratio</b>		<b>2.71</b>	<b>2.19</b>	<b>3.07</b>

## 4. Discussion

While the nature of the Technium initiative means the envisaged benefits will be reaped in the future through businesses that have since graduated from the Centres, it has been seen in this study that it has already made various significant returns to the region.

Performing this sort of analysis on a long-term project of such a nature may seem slightly unfair or inappropriate, particularly considering that the costs of the whole initiative have been included before certain Centres have had the opportunity to produce any benefits.

However, while it takes decades to develop regional economies it is important to determine whether the efforts to do so are bearing fruit by performing ex-ante appraisal. This analysis has attempted to provide a perspective on this by focussing on certain returns against the investment made and comparing them to provide a simple cost-benefit analysis.

Taking crude cost per job analysis of the figures. Many studies examining in this field consider ongoing operational costs against job creation, whereas this examination has included setup and capital costs associated with the Centres' construction. An example of this is the global competition for incubators carried out by Science Alliance, in which Technium performed very well amongst an international cohort. This makes it difficult both to appraise and compare. Even when considering capital costs the cost per job by the end of the initial phase in 2008 would have been ~ £33k and substantially less if indirect employment is credited amongst the employment. Furthermore, this cost will decrease as further jobs are created in ongoing benefits from the initial investment in the Centres.

The Technium initiative represents a bold strategic development in a region and an earnest attempt to lever the support of a key regional academic Centre to catalyse a Knowledge Economy. By approaching analysis of this initiative from both 'optimistic' and 'conservative' perspectives and homing in on a range of impacts this has helped determine a range in which the identified impacts are most likely found.

In both the 'optimistic' and conservative' models it can be seen that in the first years the returns of Technium lag behind the investments made. This is normal for most projects, particularly those relating to infrastructure where benefits follow initial investment. In the case of Technium this is understandable as the core benefits stem from the companies supported and completion of a Centre is key in its delivery.

### Recommendations for Further Research

While this analysis has provided an initial perspective of Technium and its impacts the most interesting analysis would be that undertaken once the initiative has been operational for some time, hopefully with many vibrant graduated companies in the wider community.

Furthermore, knowledge-based enterprises are complex entities and therefore their behaviours and impacts are challenging to understand and quantify. Therefore only through developing further understanding of how they can be measured and appraised the full impact of Technium could be understood.

## 5. Appendices

**Table 1: Network Investment by Year (Unadjusted)**

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007 (est)	2008 (est)
<b>Capital Expenditure</b>	285,000	1,924,000	0	7,555,538	13,106,951	19,454,993	10,016,976	4,426,525	0	0
<b>Revenue Expenditure</b>	0	415,500	461,500	860,736	1,296,920	5,273,107	5,903,764	7,389,079	6,202,846	1,316,762
<b>Year Total (£)</b>	285,000	2,339,500	461,500	8,416,274	14,403,871	24,728,100	15,920,740	11,815,604	6,202,846	1,316,762

**Table 2: Direct Employment Impact**

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007 (est)	2008 (est)
<b>Direct Jobs</b>	0	4	8	119	159	214	251	351	472	622
<b>Average Employment Cost*</b>	£24,400	£25,620	£25,620	£25,620	£25,620	£26,840	£28,060	£29,280	£30,500	£31,720
<b>Year Total (£)</b>	0	102,480	204,960	3,048,780	4,073,580	13,173,560	5,743,760	10,277,280	14,396,000	19,729,840

\* Calculated from company survey data provided by Technium for years 2001, 2003 and 2006

**Table 3: Indirect and Induced Employment Impact – Base Model**

<b>Year</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007 (est)</b>	<b>2008 (est)</b>
<b>Indirect and Induced Employment</b>	0	2	4	45	65	122	167	295	587	761
<b>Average Employment Cost*</b>	22,755	23,651	24,475	25,705	26,759	28,173	28,847	29,796	30,890	32,095
<b>Year Total (£)</b>	0	47,302	97,900	1,156,725	1,739,335	3,437,106	4,871,449	8,789,820	44,889,900	64,619,740

**Table 4: Construction Impact – Employment – Base Model**

<b>Year</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007 (est)</b>	<b>2008 (est)</b>
<b>Year Total (£)</b>	0	1,264,611	301,367	221,181	9,862,221	4,953,578	6,611,687	4,408,165	0	0

Table 5: GDP and Employment Multipliers by Sector

<b>Sector</b>	<b>GDP Multiplier</b>	<b>Employment Multiplier</b>
Agriculture, Forestry and Fishing	1.61	1.38
Extraction	1.45	1.78
Food, Drink and Tobacco	1.48	1.98
Textiles and Clothing	1.33	1.29
Wood, Paper, Pulp, Publishing and Printing	1.55	1.63
Oil and Chemicals	1.50	2.32
Rubber and Plastics	1.43	1.44
Other Non Metals	1.50	1.64
Manufacture of Basic Metals	1.86	2.31
Metals, Mechanical Engineering and Other Machinery	1.43	1.41
Electronic Engineering	1.52	1.61
Automotive Components and Transport Equipment	1.49	1.66
Other Manufacturing	1.60	1.50
Construction	1.70	1.43
Retail and Wholesale	1.47	1.33
Other Services	1.40	1.45

\* Source: The Effectiveness of Regional Grant Aid: A Welsh Perspective, Munday, Pickernell and Roberts, Paper presented to the 39<sup>th</sup> European Congress of Regional Science Association, 1999

## 6. References

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