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The Impact of Economic and Political Geography
on the Implementation and Application
of 3R Strategies



Lori Frater



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Abstract

Increasingly, current legislation in Europe and the UK seeks to restrict landfill as the prime waste management option. In response, policy makers are setting ambitious waste management targets that highlight reduction, reuse and recycling as the major options for both municipal and commercial waste. A key driver behind these new policies is the potential for the development of new economic markets for recyclates and new employment opportunities.

The purpose of this paper is to analyse how achievable these policies are within the economic and political geography of a devolved administration of the UK, Wales. The paper looks at the context of waste management in Wales, identifying the importance of regional policies and strategies in managing waste at the regional level. The objectives and targets of these strategies are outlined. The influence of the economic, physical, administrative, environmental and cultural characteristics of Wales on the achievement of these targets is assessed. The paper will utilise data gathered from a national commercial and industrial waste arisings survey carried out in 2003. The survey gathered information not only on the quantities and types of waste arising from various commercial and industrial sectors, but also data on the preferred waste management options of businesses of varying sizes, in different locations within the country and affected by different administrative structures.

By comparing the most recently available data with projected targets, the paper will analyse whether the ambitious targets set in Wales by the devolved government can be met. It asks whether the demographic structure, spatial character and economic culture of a country or an identified region within a country impacts adversely or positively on the success of regional waste management strategies. In conclusion, it will identify whether the geographical location of commerce provides the necessary opportunities for the development of new economic opportunities for business development and for markets for recyclates, and whether this development is sustainable.

About the BRASS Centre

The ESRC Centre for Business Relationships, Accountability, Sustainability and Society (BRASS) was the first ESRC Centre in Wales. It was established in 2001 with a £3.1 million grant, and has very recently received its second phase funding of £4.8 million which will take it up to 2011. The Centre is a joint venture between the University's Schools of Business, City & Regional Planning and Law. It brings together the three Schools' existing research expertise on issues of sustainability, business ethics, company law, corporate reporting and business communication.

The Centre started work in October 2001 under the leadership of Professor Ken Peattie of the Business School, Professor Terry Marsden of the Department of City and Regional Planning and Professor Bob Lee of the Law School. The Centre exists to understand and promote the vital issues of sustainability, accountability and social responsibility, through research into key business relationships.

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Introduction

For the last decade, the United Kingdom (UK) has been aware that it must alter the way it manages waste from an over reliance on landfill disposal to a more sustainable integrated waste management system. As a member of the European Community (EC), the UK is required to comply with European legislation or face severe financial penalties for any infractions¹. Current European waste legislation, particularly the Waste Framework Directive (2006/12/EC)² and its daughter directive the Landfill Directive (1999/31/EC) requires all member states to move towards a system of reduction, reuse and recycling, whilst at the same time following the principles of self-sufficiency and proximity. The Landfill Directive sets down specific targets to be met by member states and member states in turn have developed strategies to meet these requirements.

The UK's current system of devolved governance has in fact resulted not in one but four waste strategies, one each for England, Scotland, Wales and Northern Ireland. At first glance, devolved governments, with regional knowledge, should be best placed to understand the requirements and needs of their area. Their local knowledge should represent a move towards obtaining self-sufficient and proximate solutions for their administration. This begs the question whether local policy makers possess such necessary local knowledge and more importantly whether their devolved status includes the relevant powers and resources to implement their regional policies. Until recently, Wales, unlike Scotland, had neither primary legislative nor tax altering or raising powers. In these matters it was bound to Westminster and whilst, the extended powers proffered under The Government of Wales Act 2007, extends the primary legislative ability of the National Assembly for Wales, it is extended only to specific devolved matters and must first seek legislative competence³ from Westminster. However, Wales still has no primary tax raising powers.

This paper considers the degree to which the economic and political geography of the devolved administration in Wales will impact on the ambitious waste targets set by

¹ Penalties could be as much as £1,000,000 per day.

² Replacing Directive 75/442/EEC

³ The Assembly will be given legislative competence (the legal authority to pass Measures), on a case-by-case basis, by the UK Parliament. Legislative competence (Measure powers) can be granted either in Acts of Parliament or using the new route of "Legislative Competence Orders".

the National Assembly for Wales⁴. The targets when set were ambitious because Wales had one of the worst waste management records in Europe with an historical over-reliance on landfill as a disposal route. In European terms it has a low recycling rate and has more to achieve than many other devolved administrations in the UK.

This paper will examine how achievable the targets are by an analysis of the physical, economical, environmental, administrative and cultural characteristics of the country. These five factors have been chosen because each either independently or combined can influence the success of any strategy or policy as policy making needs to be developed within either a local, regional or national context and these five variables represent the general factors that will shape that context.

Data from the Welsh Commercial and Industrial Waste Arisings Survey in 2003⁵ will assist in representing the attitudes of companies in Wales to waste and in respect of the strategies. This data will provide some insight into how successful the strategies have been to date and will help to assess, their future success.

The paper is split into three sections. The first section provides an overview of the current waste situation in Wales and the policies that have been designed to achieve an improvement in waste management in Wales. Section two considers five influencing factors and analyses whether they will assist or hinder the successful implementation of these policies. The last section offers some conclusions as to the influence of geographical characteristics on the outcome of policy implementation at the regional level.

Wales: An Overview

Wales is a small country, covering an area of 8,015 square miles. It is bordered by the sea on three sides and England to the East. The population is under 3 million. Whilst it is projected that the population in South Wales-Central, North-East, North-West and Mid Wales will increase, in the other areas it is expected to decline. The average population density across Wales is 141 persons per sq.km.

⁴ Commenced life in 1999 with 60 elected members

⁵ In 2003, 2,210 Welsh commercial and industrial organisations were surveyed in order to collect data on the quantities and types of waste produced in Wales. The completed survey information will assist in producing estimates of waste production for industry and commerce for a wide range of waste streams in different regions as well as providing national estimates for each type of business. The data will also be used to provide a benchmarking tool for industry.

Gross Domestic Product (GDP) per head is 82.2% of the EC average⁶ (the second lowest within the UK) although growth in Wales was higher than the UK as a whole (NAW, 2005). The objective for Wales is to increase the rate of growth incrementally so that by 2010 growth will be at 90% of the UK average (NAW, 1999).

Historically, the Welsh economy was reliant on resource based, heavy manufacturing industry. Since the 1980s, Wales has undergone an economic transformation and today has an economy based on a wider range of business sectors that has included an aim to attract foreign owned corporations⁷ via inward investment. Data from the Institute of Welsh Affairs stated in Wales, manufacturing and construction employ about 28% of the workforce and represents over 28% of GDP in Wales, compared with 22% for the UK as a whole (Institute of Welsh Affairs, 1998). Welsh manufacturing data is heavily influenced by the steel industry, which contributes over 35% of the total UK steel production. Service industries, particularly tourism are a major growth area for Wales; this is because it is mainly a rural country.

The decline in traditional heavy industry resulted in a collapse of employment and today Wales still suffers from high unemployment. This is coupled with a low skills base, which restricts the types of economic activity that Wales can attract or develop. The low skills base is partly a result of a low attainment of academic and vocational qualifications by the Welsh workforce. The impact of a low skills base is whether Wales can meet the challenges of developing new waste minimisation and recycling technologies if it seeks to combine opportunities through waste strategies with improving economic stability as recognised in the Wales Waste Strategy 2002:

We must realise the economic opportunity to use unavoidable wastes as a resource that can generate, on a local basis, wealth and employment opportunities for social enhancement and environmental benefit.

The low economic base is of significance because apart from addressing waste issues, the Welsh Assembly Government (WAG) must also improve the economic position of the country, by responding to the problems of low GDP and high unemployment. This raises particular issues in relation to the waste strategy. Will economic growth

⁶ As of 2002, National Assembly for Wales, GDP per head in European Regions, January 2005

take precedence or can the WAG break the historical link that economic growth results in waste production? It appears that the WAG seeks to achieve both, primarily by creating economic and employment opportunities from the creation of recycle markets.

In Wales, economic and environmental improvement must fulfil the criteria of sustainable development, as the Government of Wales Act 1998 contained a commitment to sustainable development, making Wales unique from the other UK devolved administrations:

“(The) Assembly shall make a scheme setting out how it proposes, in the exercise of its functions, to promote sustainable development”.

The interpretation of sustainable development has, however, been victim to the priorities of the interpreter. If the priority is to improve economic growth (the emphasis being on economic sustainable development) via the creation of new recycling markets will this be at the expense of implementing waste prevention and reduction policies (ecological sustainable development)⁸? As the Waste Strategy seeks ‘*to realise the economic opportunities*’ from waste, it appears that an economic sustainable development interpretation is favoured.

Wise about Waste: A Waste Strategy for Wales

From the outset, the Welsh waste strategy recognises that ‘*waste is Wales’ biggest environmental problem*” (WAG, 2002) and that Wales has to improve how it manages waste. The Assembly Government’s intention for the waste strategy is:

“...to move Wales from an over-reliance on landfill to a position where it will be a model for sustainable waste management...it will achieve this by adopting and implementing a sustainable, integrated approach to waste production, management and regulation...that minimises the production of waste and its impact on the environment, maximises the use of unavoidable waste as a resource....”
(WAG, 2002)

The strategy is linked to the WAG’s sustainable development scheme, and is in response to European legislation, which is the key driver for current UK and devolved

⁷ During the period 1996-1997, Wales attracted over 20% of new jobs within the UK from inward investment.

government waste strategies. The strategy has two primary objectives, the first is to make Wales a model for sustainable waste management and the second is to comply with the requirements of relevant European Council waste Directives and UK legislation. There is too much applicable EC legislation to discuss within this paper, but of particular import is the Framework Directive on Waste⁹ and the Landfill Directive¹⁰. In summary the Framework Directive requires member states to:

- Take all necessary steps to prevent waste generation;
- To encourage reuse;
- To ensure safe disposal;
- To establish principles of self-sufficiency and proximity; and
- To establish an integrated and adequate network of disposal installations

The Landfill Directive, as the name suggests is more specific and requires member states to

- Cease co-disposal at landfill;
- Ban certain wastes from landfill¹¹;
- Ensure pre-treatment of all land-filled wastes; and
- Reduce biodegradable municipal waste disposed to landfill so that by 2020 it is 35% of that produced in 1995.

The Landfill Directive should have been transposed into domestic law by 16 July 2001, but in fact was transposed into domestic legislation by the Landfill (England and Wales) Regulations, which came into force on 15 June 2002.

In addressing the requirements under EC and UK legislation the Welsh waste strategy has set the following targets for commercial and industrial waste, these are classified as secondary Wales specific targets, the Assembly Government recognises that it has

⁸ Ecological Sustainable Development highlights that in sustainable development emphasis should be on conserving and enhancing the community's resources so that ecological processes are maintained. It looks beyond economic progress to achieve sustainable societies.

⁹ 75/442/EEC as amended by 91/156/EEC and 91/692/EEC

¹⁰ 1999/31/EC

¹¹ Hazardous wastes such as explosive, corrosive, oxidising, flammable or highly flammable, hospital and clinical wastes, tyres and liquid wastes.

less influence over the outcome¹², presumably because at the time of writing the strategy, Wales legislative powers were more limited than they are today under the Government of Wales Act 2007. It encourages business to aggregately achieve the following reductions.

Table 1: Welsh Waste Strategy Targets (WAG, 2002)

Aim	Target
<i>Waste minimisation target for public sector and business:</i>	<ul style="list-style-type: none"> • By 2005, achieve a reduction in waste produced equivalent to at least 5% of the 1998 arisings figure; • By 2010, achieve a reduction in waste produced equivalent to at least 10% of the 1998 arisings figure.
<i>Diversion of commercial and industrial waste from landfill:</i>	<ul style="list-style-type: none"> • By 2005 to reduce the amount of waste sent to landfill by 85% of that landfilled in 1998; • By 2010 to reduce the amount of waste sent to landfill by 80% of that landfilled in 1998.
<i>Diverting commercial and industrial biodegradable waste from landfill:</i>	<ul style="list-style-type: none"> • By 2005 to reduce biodegradable waste sent to landfill to 85% of that landfilled in 1998; • By 2010 to reduce biodegradable waste sent to landfill to 80% of that landfilled in 1998.

The targets are based on commercial and industrial waste production data collected from the UK National Waste Production Survey during 1998 and 1999. Table 2 outlines the findings from that survey

Table 2: Wales: Quantities of Waste by Sector¹³

Waste Stream	Quantity Produced (thousand tonnes per annum)
Industrial	4,989
Commercial	1,141
Construction and Demolition	3,285
Sewage Sludge	405
Agricultural	6,075
Mines & Quarries	6,000
Household	1,330
TOTAL	23,225

¹² Primary specific Wales targets are where the Assembly Government and its key partners (local government) have a direct influence over the outcome. These primary specific targets are, therefore, directed to public bodies reducing their own waste arisings and minimum recycling and composting targets for local authorities.

¹³ The Environment Agency, Strategic Waste Management Assessments: Wales 2000

In summary, Wales during 1998/99 produced over 23 million tonnes of waste, of which commercial and industrial waste amounted to over 6 million tonnes. Recycling figures within the industrial sector indicated that Wales had what appeared a good recycling rate of 62%. The reality was that these figures were the result of an 81% recycling rate within the metal refining sector¹⁴ and that the remaining industrial sectors were not engaged in such a high level of recycling.

In contrast to the industrial sectors recycling rate, nearly 70% of all commercial waste was sent to landfill, with just under 18% being recovered or recycled.

Some of the issues faced by the WAG in developing its waste strategy can be summarised as:

- The waste problem in Wales is not just the volume of waste produced but the way waste is managed does not meet modern environmental standards
- The preferred waste management method in Wales is landfill
- Landfill void capacity is decreasing
- Commercial and municipal waste is expected to increase by about 3% a year. This is in line with the rate of increase in the UK as a whole. This increase is expected to occur over the next ten years¹⁵ before it begins to reduce¹⁶. The 1998 baseline figure for commercial waste produced was 1,141,000 tonnes; a 3% increase per year to 2010 would result in an increase to 1,628,000 tonnes. In 1998, approximately 781,000 tonnes of waste was disposed to landfill; the target requires that by 2010, 574,000 tonnes only should be sent to landfill. The 3% increase to 1,628,000 tonnes means that Wales will have to divert 566,000 tonnes of waste from landfill, therefore a reduction from 70% sent in 1998 to 35% in 2010.

C&I Waste Survey Methodology & Data Collection

The 1998 survey provided baseline data from which strategies could be produced and measured. However, in relation to Wales, the survey was not Welsh specific and only about 0.5% of the Welsh business population was surveyed. In 2003, the ESRC Centre for Business Relationships, Accountability, Sustainability and Society

¹⁴ The metal refining industry accounted for about 53% of industrial waste in Wales.

¹⁵ Beginning from 2005

¹⁶ South East Wales Regional Waste Plan, 11

(BRASS) in partnership with Environment Agency Wales undertook a Welsh specific survey of commercial and industrial waste production, the data from which will be utilised by the Environment Agency Wales, Welsh Local Authorities, WAG and numerous other stakeholders.

The BRASS Centre conducted on-site surveys of 2,100 commercial and industrial organisations across Wales, representing 2.5% of the business population. The survey design was based on a stratified sample using industry sector type (SIC) and company size to produce estimates of a +/- 3.5% accuracy with a 90% confidence level. The sample represented key industrial sectors within Wales important to the Welsh economy. All companies were randomly selected and participation was voluntary. A standardised questionnaire was used to collect the relevant data, which included information on:

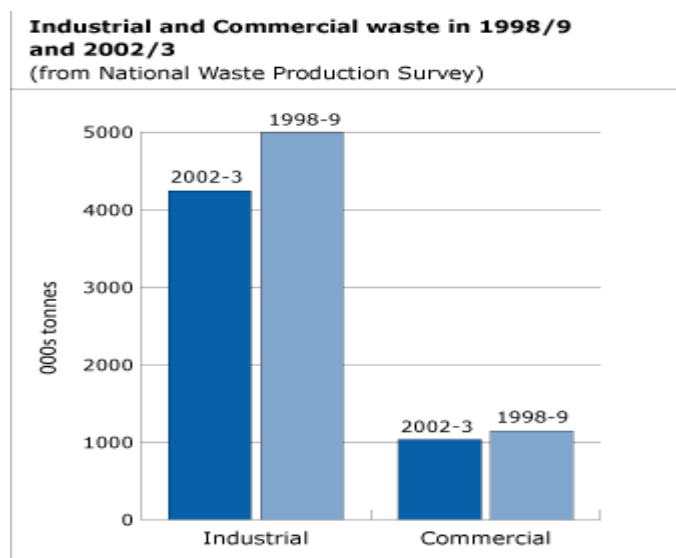
- Type of waste (using List of Waste classifications);
- Quantity of waste;
- Waste form;
- Waste management option;
- Destination of waste; and
- Waste contractor.

In addition, information was also collected on the environmental knowledge of the company including whether the conducted environmental or waste audits, operated under an environmental management system and whether they were involved with any environmental business support organisation.

The response rate to the survey was 97% with an even distribution across all identified sectors. A number of methods were employed to ensure the accuracy and quality of the data, including 3 levels of quality assurance of the raw data, checks on consistency of coding waste types, follow up questions with companies, validation after weight to tonnage conversions and a final validation of figures after grossing up to national tonnage. This stringent quality assurance was undertaken to ensure that the data was fit for purpose.

Businesses in Wales produced 5.3 million tonnes of waste during 2002-2003 compared to the 6.1 million produced in 1998-1999 a fall of 14%. There could be a number of reasons for the decrease in the quantity of business waste produced; one positive response is that the waste strategy is achieving its aims. There are however alternative propositions, firstly during the survey it became apparent that a number of industries were closing or relocating and therefore the economic structure of Wales was changing from an industrial base (high waste producing) to a service based economy (less high waste producing). Secondly, only 500 companies were surveyed in the 1998-99 survey in contrast to the 2,100 companies in the 2002-2003 survey, consequently providing a more representative sample of businesses in Wales but also that the figures from the 1998/99 survey and the 2002/03 survey were not comparable. The diversity of companies surveyed in the 1998-99 survey was less extensive than the 2002-2003 survey again casting doubts on the ability to compare the two figures. Questions must be raised in relation to the validity of the 1998-99 figures being utilised as a baseline. In fact a prime reason for the independence of the Wales survey in 2003 was to obtain improved baseline data for Wales.

Graph 1: Comparison of Waste Arising Data



Source: Environment Agency Wales¹⁷

The survey provided BRASS with considerable qualitative data, particularly the attitudes of companies to waste, information on whether companies had considered reducing their waste, their knowledge in relation to current waste legislation and how this legislation may affect their business.

The remainder of this paper will utilise this qualitative data to highlight and consider any potential barriers to the success or failure of the strategy's objectives and target, by considering each of the five influencing factors stated previously (economic, physical, administrative, environmental and cultural) and will assess how these factors can have an impact on the success of the Welsh waste strategy.

Geographical Factors of Influence

With or without the pressures of EC legislation, Wales would still have to alter how it manages waste. Current disposal to landfill is unsustainable and landfill capacity is declining. In 2006 it was estimated by the Environment Agency that Wales had 36.9 million cubic metres of void landfill space¹⁸. Valuable resources are being squandered and as the Assembly has highlighted there are economic opportunities through the use of waste as a resource that can generate on a local basis, wealth and employment, opportunities for social enhancement and environmental benefits (Waste Strategy 2002). In seeking to maximise these opportunities, the Assembly, as a devolved administration should be sensitive to the needs of Wales and factor in particular Welsh issues into its waste strategy. Each influencing factor has been divided into sub sectors to provide a more detailed analysis.

For the purposes of analysis, the main targets under consideration will be that:

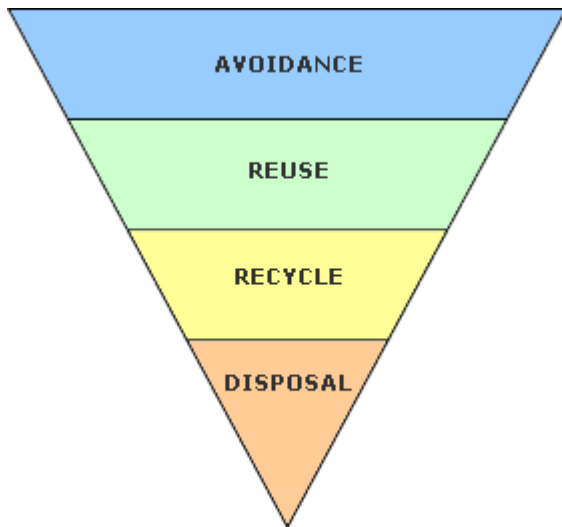
- By 2005 a reduction of waste by 5% of the 1998 figure (a reduction to 5,823,500 tonnes produced a year) and by 2010 that waste produced should be reduced to 10% of the 1998 figures (a reduction to 5,517,000)
- By 2005, to divert waste from landfill to less than 85% of the 1998 figure (a reduction to 2,066,00 tonnes) and by 2010 a further reduction to 80% of the 1998 figure (a reduction to 1,944,000 tonnes)
- By 2005 a reduction in commercial and industrial biodegradable waste to landfill to 85% and by 2010 to 80% of the 1998 figure).

To achieve these targets, the WAG has highlighted a substantial number of principles and paths to success. The overriding principles are to work in partnership with local authorities and other key stakeholders to produce an integrated sustainable waste management system, which will fulfil the requirements of the waste hierarchy.

¹⁷ http://www.environment-agency.gov.uk/regions/wales/816243/1220048/1223323/1234874/?version=1&lang=_e

¹⁸ http://www.environment-agency.gov.uk/commondata/acrobat/fs/wales2005_1797315_1797315.pdf

Figure 2: The Waste Hierarchy



To achieve the goals of reduction, re-use and recycle, the following key principles and strategies have been identified by the WAG as key to success.

Table 3: Waste Strategy Principles and Strategies

PRINCIPLES	STRATEGIES
SUSTAINABLE DEVELOPMENT	RESOURCE PRODUCTIVITY
PROXIMITY	INNOVATIVE PRODUCT DESIGN
SELF-SUFFICIENCY	DEVELOPMENT OF RECYCLING MARKETS
LOCAL COMMUNITY BASED SOLUTIONS	DEVELOPMENT PLANNING FOR CREATION OF WASTE MANAGEMENT INFRASTRUCTURE
INTEGRATION/PARTNERSHIP	SUSTAINABLE TRANSPORTATION
TACKLING SOCIAL DISADVANTAGE	BETTER WASTE DATA

Each of these principles and strategies, however, interact with the aforementioned geographical factors and is therefore very important that a clear understanding of these interactions is gained if policy implementation is to be successful.

Physical Characteristics

The Wales Waste Strategy strongly favours “solutions that meet the needs and aspirations of local communities” (WAG, 2002), that “waste should be recovered or disposed of as close as possible to where it has been produced in order to reduce the environmental impact of transporting it” (WAG, 2002). A sustainable transportation of mixed waste streams is favoured, as these should be dealt with as near as possible to its source of production. Finally, areas should be self-sufficient, that is there

should be sufficient capacity in terms of waste management facilities to manage the wastes produced in any given area (WAG, 2002).

As stated previously, Wales is a small country. Only 3% of the country is urbanised, 79% of land is used for agriculture. The most urbanised area of Wales is the South East with both the greatest population density and industrial development. There is therefore, great divergence between areas in relation to varying employment rates, skills level and general infrastructure. Half of all licensed waste management facilities¹⁹ operating in Wales are located in South Wales. The 2003 Survey revealed that there is an unequal provision or distribution of recycling facilities across the country with the South being better provided. One reason for this is that the South has a better infrastructure than many of the other regions within Wales; it has direct access to England and as a result of this has received major development funding. Another important factor is that a number of the Local Authorities provide recycling collection facilities for commercial organisations.

Vital to the success of the waste strategy is that wastes should be dealt with as close as possible to source. The strategy identifies that for some types of waste this could be within a single local authority area, or within a region of Wales, within the whole of Wales, or the wider UK. Dealing with waste at source requires an effective infrastructure system. There is a definite lack of appropriate infrastructure, particularly in relation to the recycling initiatives and diverting wastes from landfill during the survey a number of companies, particularly in West Wales, complained about the lack of recycling options whilst in North Wales many stated that waste was sent to England to be managed.

Any successful recycling system also requires appropriate planning. Planning and its relationship to the physical environment is also a factor determining local provision. Public resistance to the development of alternative waste management options whether recycling facilities, energy from waste facilities or other has held back the development of infrastructure. This is especially the case in rural or scenic areas of Wales where the potential conflict between waste management facilities and tourism has led many planning authorities to respond negatively to proposed waste

¹⁹ 368 active licensed waste management facilities as of June 2002 – Welsh Assembly Government, Wise about Waste: The National Waste Strategy for Wales, Part One, June 2002, 75

infrastructure developments, even if this has meant less waste being diverted from landfill.

If wastes are to be dealt with in the most effective and sustainable manner, there must be easy access to these wastes. North and South Wales are served by a major east-west road system that is from England to Swansea in the South and from Wrexham to Holyhead in the North, there are also rail links along the same corridors. However, both road and rail links from North to South Wales are poor. The result is that mid-Wales is poorly served by transport links. In addition, although the North has a major road network, the road quality is very poor. For example a road trip from Cardiff to Swansea (41 miles) should take approximately 50 minutes. A trip from Abergele to Bangor (28 miles) will take 45 minutes.²⁰

Figure 3: Major roads in Wales²¹



The results of poor accessibility were highlighted in the 2003 Survey as many companies surveyed expressed frustration at not being able to recycle waste streams due to the lack of available recycling collectors, who would travel to their area. As a result, these companies had to rely on what services were available and that invariably was landfill.

It is not the proposition of this paper that new motorways are built to resolve this problem but that more localised solutions may need to be considered or better utilisation of available services for example the incorporation of social enterprises into the local waste management infrastructure through improved relationships with local

²⁰ AA Route Planner

²¹ National Statistics Online <http://www.statistics.gov.uk>

authorities or improved referrals from local authorities or environmental business support organisations.

If the creation of recycling markets is to be an incentive to improve the economic position of Wales, then the companies who operate within these sectors have to be economically viable. Grants and public funding provided to these new developments have to be not only accountable but include exit strategies. New publicly funded recycling companies have to become self-sufficient or remain a permanent financial burden on the public purse, but if the cost of collection is too high due to poor physical accessibility, financial restraints become a barrier to new companies. Subsequently, it is left to Local Authorities to provide the service and few Local Authorities in Wales do provide recycling facilities. The Authorities that do are within South Wales, which already has privately run enterprises and so is relatively well provided for and has greater accessibility for companies than other areas of Wales.

Economic Characteristics

The strategy seeks developments in clean technology to reduce and prevent waste production; it requires the development of recycling markets to satisfy both economic growth and to meet diversion from landfill targets. Does the current economic structure of Wales assist or hinder the implementation of the targets?

There are approximately over 60,000 businesses in Wales. The Welsh economy is predominately composed of micro companies, 93% of the companies employ less than 25 people. In addition, many of the larger scale companies are foreign owned, due to the inward investment policy applied in Wales. The economic situation is further handicapped by a low skills base within local communities.

The economic characteristics of a country can have major implications on how successfully it can implement its policies. The dominance of small to medium enterprises (SMEs) has a number of implications. To successfully implement the waste strategy, businesses are encouraged to develop innovative product designs, which will ensure that products are more durable, more easily re-usable and recyclable and therefore less disposable. They are encouraged to implement appropriate and, where necessary, innovative waste management systems. They are

expected to invest in resource productivity, thereby achieving an improved economy without squandering natural resources. These approaches require research and development and new technologies, skills, expertise and a desire to undertake innovation. These are generally lacking in many businesses in Wales, partly as a legacy from the old industrial past.

SMEs in general have few spare resources to devote to developing business, or to undertake research and development or to spend resources on training. For many, the main objective is to survive. In the UK, Wales has the lowest expenditure on research and development, and the strategy of inward investment has resulted in Wales having the characteristics of a branch plant economy. This has resulted in the development of very limited company research and development facilities, assembly based production and very few national headquarters based in the country (Flynn, 2001). It is, therefore, very difficult for many business managers to make decisions about innovation and resource efficiency at the local level.

Currently, Wales is losing businesses at a faster rate than the UK²² as a whole. During the 2003 survey approximately 3% of companies issued from the UK's Office of National Statistics were found to be no longer in business. A high loss of business activity may negatively impact on the available demand for recycling activities. The question for Wales is whether there is sufficient demand (both for material to recycle and for the recycled material itself) from the current economic base to support new recycling initiatives?

The 2003 Survey encountered a number of companies who wanted to find an alternative source for their waste streams other than landfill. However, many were unable to utilise available resources because the quantities they produced were economically non-viable for collectors. As small companies they also did not have sufficient space to store the waste until a viable economic quantity was obtained, so their only alternative was to send materials like paper and cardboard to landfill. Many micro organisations are restricted by the size of their premises from making significant on-site changes to waste management. The demand for recycling activities exists, but until there is co-ordination of the demands from individual companies the quantities for collection are unattractive to collectors. For example, there were

occasions during the 2003 Survey when a number of companies on one industrial estate had the same problem waste stream with no recycling opportunities. Collectively, they could have offered a supply of a material for collection by recyclers, but there were no strategies in place to assist these companies to combine their resources. If properly applied the principles of proximity and self-sufficiency should be encouraging such local initiatives.

There also has to be a demand for recycled materials. Lack of demand for recycled materials is the biggest obstacle to increasing recycling rates. In response Wales has provided support to create this demand through the use of Objective 1 funding²³. Through the use of this funding it is estimated that 1,000 jobs could be created (Institute of Welsh Affairs, 1998). However, the Waste Resources and Action Programme²⁴ (WRAP), one of the major partners with the UK government, aiming to achieve increased recycling, has stated that £6 billion of investment is required in the reprocessing infrastructure over the next 15 years²⁵. In fact substantial sums are being invested in Wales to meet the targets set by the Strategy; Table 3 provides an outline of funds provided by the WAG. For example WRAP operates a new funding scheme that allows SMEs to lease plant and recycling equipment²⁶. Despite this, it is beyond the remit of WRAP to provide investment for recycling infrastructure, and there appears to be limited commitment from the WAG to develop this.

Table 4: WAG Waste Minimisation Funding (WAG, 2002)

AMOUNT OF FUNDING	AIM
£79 million for 2001/02-2004/05	To assist Local Authorities & others to meet targets for minimisation, recycling, composting and limiting landfill
£3.25 million	New Opportunities Fund for community sector re-use and recycling project over 2003 -2005

Currently, landfill is the cheapest means of disposing waste. From 2005, the UK Government is increasing the landfill tax by £3 a tonne per year until it reaches £35 a

²² Welsh Development Agency, Implementation Plan for the Entrepreneurship Action Plan for Wales, 8

²³ Objective 1 is part of the European Structural Funds in Wales. It funds can be used to promote the development and structural adjustment of regions whose economic development is lagging behind.

²⁴ WRAP is a not-for-profit company supported by funding from Department of the Environment, Farming and Rural Affairs, the Department of Trade & Industry and the devolved administrations of Scotland, Wales and Northern Ireland. It is working to promote sustainable waste management by creating stable and efficient markets for recycled materials and products.

²⁵ WRAP, Press Release, Get Yourself Sorted, 24 February 2004 This is for the UK as a whole, but it is an indication that further funding is required and Wales needs to look to the UK Treasury for any increase in available finances.

²⁶ eEquip Residual Value Guarantee Scheme

tonne by 2011/12. The sums invested by the WAG (see Table 3) via WRAP, Arena Network²⁷, Envirowise²⁸, Groundwork²⁹ and many others is an attempt to discover other viable alternatives. This funding is to assist in diminishing the barriers created by technical constraints and market restrictions and of course, to help create local markets, which would minimise the costs resulting from transportation.

The results of the 2003 Survey indicated over 80% of the companies surveyed had no knowledge of or contact with any of the aforementioned organisations, showing that in terms of integration into the economic development of the country with respect to waste, there was a lack of communication and limited inclusion in decision making.

Businesses have a vital part to play in the sustainability of a country, particularly large organisations; these might pose a different set of barriers to successful strategy implementation than those smaller firms found in the same sector. As stated previously, due to the decline in heavy industry, Wales has had to seek economic growth through encouraging foreign owned companies to base their activities in Wales with the assistance of inward investment. Wales has been very successful, receiving about 20% of new jobs promised for the UK as a whole during 1996-7 (Institute of Welsh Affairs, 1998)

The impact of this on waste can be seen by studying material flows through supply chains. Hines and Flynn (2001) have analysed the importance of material flows as a means of quantifying gains and losses in determining the ecological sustainability of a country such as Wales. Figure 4 indicates the potential flows into a region or country and the potential for material leakage (and its associated economic and ecological value) out of the region or country.

By applying such a model, a region or country may be able to assess the degree to which the area is gaining or indeed losing, value from the movement of materials. It also provides some insight as to whether inward investment organisations are linked to the local economy through locally based purchasing and the retention of materials within the area. Or, whether by nature of their supply chain they remain mobile. Problems are compounded by a lack of local or national commitment by overseas

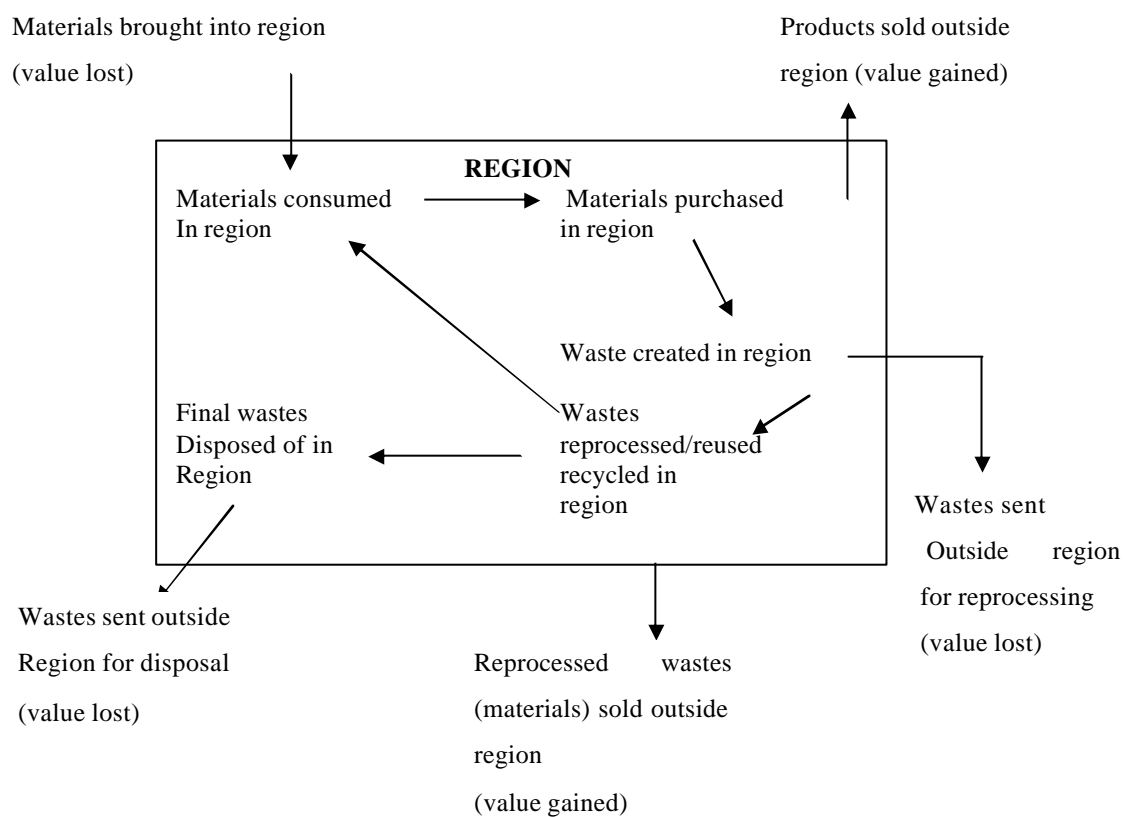
²⁷ An independent organisation providing support to business and other organisations primarily on environmental issues.

²⁸ Is a government-funded programme offering free, independent advice on practical ways to minimise waste and increase profit.

²⁹ Is an environmental regeneration charity providing sustainable development in many of the UK's poorest communities

companies allowing them to relocate. This directly affects the economic viability of different waste management options. A loss of resources by reprocessing or disposing of wastes outside of the area results in negative value to the economy. For example, glass bottles that are collected in Wales but are sent to England to be recycled and then returned as bottled goods to Wales means that Wales not only loses the opportunity of job creation through local reprocessing but also the loss of the material. In addition Wales pays companies in England for the reprocessed materials resulting in further financial leakage from the country.

Figure 4: Regional Economic Material Exchanges (Flynn, 2001)



In summary, the economic characteristics of Wales hinder the implementation of the waste strategy because:

- Wales has a low level of entrepreneurial activity, which may mean that the development of recycling markets may have to be developed by encouraging businesses into the country;
- There is a lack of in-depth, co-ordinated research into the availability of recyclable material, although this is slowly beginning to change. Many micro organisations do not have viable quantities individually but collectively can provide sufficient quantities that warrant collection;

- An economy based on micro organisations has to understand the challenges faced by those micro organisations:
 - Lack of development resources;
 - Lack of incentives;
 - Lack of stability;
 - Lack of capacity to make on-site changes to waste management;
- A general lack of research and development culture in businesses in Wales, not assisted by inward investment and has meant limited waste management innovations;
- A lack of data on the material flow of supply chains of inward investment companies and indigenous companies has meant the complete picture of value retention and leakage is not known; and
- In the short term any shift from cheap disposal to landfill to more recycling will be expensive. Current pricing of waste management options are practically in reverse of the waste hierarchy. Landfill is the cheapest followed closely by incineration. Increasing the cost of landfill, does not necessarily mean companies will automatically choose recycling as the alternative, companies may in fact choose another form of cheap disposal like incineration. When involving markets in environmental issues, it is likely that imperfections will occur and that economic instruments will be required. Introducing economic instruments to encourage more sustainable waste management should therefore reflect the position of the waste management option in the waste hierarchy. It is believed that not until the Landfill tax finally reaches £35 per tonne will it have any effective influence (Rural Food Committee, 2003).

Administrative Characteristics

Administrative factors in relation to the implementation of the waste strategy include available business support and co-ordination, the availability of waste related data and the integration between Central Government, the Assembly Government and Local Authorities.

The waste strategy clearly identifies that integration and partnership are vital. It also accepts that the development of planning is necessary for the creation of a waste

management structure. Further, it identifies the role of better waste data in developing sustainable responses.

Business support and co-ordination are fundamental, because the strategy's targets for business are not mandatory. The strategy has to encourage businesses to reduce their production of waste and to divert their wastes from landfill. By increasing the landfill tax, it is hoped that companies will choose to seek alternatives rather than pay the increased cost of landfill disposal. That can only be successful if the cost of the alternatives is less than the increased cost of landfill disposal. As outlined above, Wales predominately has an economy composed of micro organisations. The cost of introducing alternative strategies for these companies may be severely cost prohibitive. During the 2003 Survey a few of companies stated that if they had to meet any additional costs they would go out of business for instance the lack of hazardous landfill sites in Wales meant that for one company they have a fourfold increase in the cost of disposing of hazardous waste. Whilst this is only one company it is not unreasonable that other small companies dealing in hazardous wastes are also experiencing increased costs due to the lack of hazardous landfill provision in Wales. Further, the cost of introducing alternatives has to be cost effective over a given period of time. The initial costs of introducing new technologies will be problematic for a number of organisations.

As mentioned previously, there are a number of organisations within Wales and the UK in general that have been established to provide business support. It is believed that because SMEs have not been engaged in the waste debate, they are not aware of what help there is available (Rural Food Committee, 2003). This view is supported by the findings of the 2003 Survey, with a substantial number of the companies having no knowledge of existing business support organisations. Of the companies surveyed 4% were involved with Arena Network, which is generally considered to be the main environmental business support organisation in Wales.

Organisations like Arena Network have been charged to assist companies to conduct waste audits, install appropriate waste management systems and also to assist in the creation of recycling markets. They aim to achieve this by conducting necessary marketing research into potential markets, and also by providing a network of information on recycling materials available. In recent years the WAG Material

Action Programme has financed many new schemes aimed at assisting companies based in Wales and recently have redesigned the business support scheme in order to maximise assistance.

Recycling requires intelligence relating to who is producing what waste and where, and who is a potential user of waste material and where. Although this system exists it would appear to have limited application. This might be because companies either do not know of the service or are apathetic about its use.

Not only is co-ordination vital amongst business support organisations, but is also vital between the various levels of government. Wales has 22 local authorities, each with responsibility for meeting waste strategy targets. It is essential that in applying the principles of proximity and self-sufficiency, all 22 authorities and the Assembly work in co-ordination. The influence of internal politics means that each Authority may seek to implement strategies in its own individual style. Local Authorities will be ultimately responsible for fulfilling the statutory targets to comply with EC legislation and any penalties for infractions will therefore, undoubtedly be met by Local Authorities. Currently, there is little evidence to suggest how this will affect the partnership relationships between the Authorities and the Assembly.

Fundamental to the success of the strategy is the role of access to waste data. Targets are based on the data provided by the Environment Agency from their National Waste Survey of 1998/99 waste production. As stated above, in Wales only about 0.5% of the Welsh business population were surveyed and at this time the data was heavily influenced by the waste figures from the metal refining industry. The success of any survey is reliant on the original data provided. For the 2003 survey, the UK's Office of National Statistics provided the data set of companies. This data set proved to be quite unreliable, with a number of the companies having gone out of business many years previously, and a number of companies having been duplicated in the data set due to errors in data entry. What this revealed was that there was no completely accurate data available of the current business population. The impacts on the survey were on the stratified sample of industry sector type (SIC) and company size. The purpose of the survey was to provide waste data for each industrial sector, thereby highlighting problem sectors, sectors that are improving and baseline data for future reference. The original data set included a representative percentage of industry

sectors, but the data supplied had incorrect company sizes and incorrect industry sector type, thereby altering the percentage representation of industry sector types and size bands.

The data that is gathered is only as good as the data provided by the waste producer. A main factor of the 2003 Survey was the lack of knowledge amongst SMEs about the waste management of their waste. Over 30% did not know whether waste went to landfill or was recycled, they did not know who collected their waste or how much of it was disposed. Of major importance to targets relating to reducing the amount of biodegradable waste, was the lack of knowledge about what wastes were disposed in the mixed general waste stream and the respective quantities involved. In addition, the survey did not have the opportunity to identify the quantities of waste stockpiled on site due to the lack of collection services.

Environmental Characteristics

The strategy clearly identifies that waste is a major environmental problem for Wales. It encourages businesses to embrace eco-design, to minimise environmental impacts of products, to seek new uses for recycled materials and to use secondary material to replace virgin materials. Businesses are further encouraged to achieve waste minimisation and to reduce disposing of wastes to landfill. With a statutory commitment to sustainable development, it would imply that the Welsh Assembly is committed to environmental improvements.

The environmental waste problem facing Wales is that current levels of disposal to landfill are unsustainable. There is little segregation of waste at source and this is particularly significant in relation to achieving a reduction of biodegradable wastes being disposed to landfill. Mixed general waste is a substantial waste stream within commercial and industrial organisations and other common wastes disposed of in this waste stream are often hazardous including electrical goods and fluorescent tubes. Segregation at source requires sufficient space within a company to allow it to house the necessary different containers but not all organisations have the luxury of space, so a range of environmentally damaging wastes continue to be landfilled.

Proximity is central to the waste strategy and as stated above currently in Wales wastes from certain areas (particularly North Wales) are sent to England to be

disposed. Toner cartridges for example are recycled by being returned to the supplier or to a charity, most of which are in England or Scotland. There has been no research into whether this recycling of toner cartridges is the most environmentally efficient approach if the distances that they have to be transported are factored into the equation. A further key environmental concern is that due to the economic potential of developing recycling markets, recycling may be given more attention than preventing and reducing waste, which is, in the long term, the more sustainable option.

How Wales deals with this potential issue will depend on how the term “sustainability” is interpreted, whether it is ecological sustainable development or economic sustainable development.

Cultural Characteristics

Cultural issues are significant. Wales has a heritage of over reliance on landfill and in relation to wastes an attitude of “out of sight, out of mind”. Although Duty of Care places a duty on waste producers to ensure that their waste is managed properly and safely³⁰, the 2003 Survey showed that this was not a priority for producers. As stated above, there was a lack of knowledge about not only the identity of the waste contractor but the destination. There is still a practice in rural areas of Wales of unlicensed metal scrap merchants touring the country collecting scrap metal from producers and selling it on elsewhere, whilst not restricted to rural areas, the survey revealed this activity to be more prevalent in rural Wales. This is a hidden industry, because it is not recorded. The result is that producers who utilise this sector do not have any details of the disposal of this waste stream and this is archetypical of the attitudes towards waste management within rural areas.

In arranging the interviews at least 3% of the companies asked to participate in the survey did not believe that they created any waste at all. It was not that they thought that they had zero waste, but that they did not create large-scale industrial waste. The quantities of waste they produced were minimal and were, therefore, perceived as being of no importance. This attitude is key to the success of the strategy; it will require substantial education to alter the current culture and perceptions of waste

³⁰ Section 34 Environmental Protection Act 1990

within business. Once education becomes a necessary factor, the timescale for the success of a strategy becomes long term.

The Assembly and Local Authorities will have a substantial task to try to alter the waste management attitudes of a number of micro organisations. Micro organisations surveyed during the 2003 Survey commented “this is the amount of waste we produce, it cannot be changed.” Although about 50% of the companies involved in the survey did monitor their waste expenditure only 38% of those that had, had also undertaken a waste audit and less than 20% had undertaken any form of waste reduction, there appeared to be little connection made between waste minimisation and waste expenditure. A culture in which resource use and waste disposal are not linked in the public mind has major barriers to overcome if waste management behaviour is to be altered. This can also impact on existing companies, who may not be willing to devote scarce resources to new innovations.

The cultural attitudes to waste in Wales also permeate into attitudes to enterprise. The WAG has recognised that Wales has a poor entrepreneurial enterprise record

“...we have a long standing tradition of self-employment, but the innovation and entrepreneurial culture to create a truly dynamic small and medium enterprise sector is not as strong as we would wish.”³¹”

If there is a lack of entrepreneurial enterprise this will have a significant impact on a strategy that requires the development of new markets, involving identifying gaps and conducting the necessary pro-active marketing to fill the gap and create a successful market for a new product.

Wales has a waste producing culture, which will only be altered over the long-term and not in the immediate future. The cultural characteristics of Wales will impact on the success of the strategy because of:

- An ingrained waste producing cultural mentality;
- A general lack of responsibility for one’s own waste;
- A general lack of awareness in relation to new requirements to alter waste management systems;

³¹ First Strategic Plan of the National Assembly for Wales April 2000

Conclusions

The physical, economic, environmental, administrative and cultural characteristics of a region or country do impact on the success or failure of waste strategies. They are the reality in which the policies and strategies must operate. Without a clear and detailed understanding of these characteristics, strategies can falter and fail to meet their objectives.

In relation to meeting the targets for commercial and industrial organisations, a better understanding of the attitudes of companies is required. The 2003 Survey will assist in providing some of this data. This survey provided a rare opportunity for researchers to talk to over 2,000 companies and to obtain a clearer understanding of their attitudes, needs and knowledge. Over 70% of the companies surveyed, although aware that there were some changes occurring within waste management, were unaware of exactly what the changes were and how it would impact on them. This is a stark finding for business support organisations.

Wales still has a mountain to climb to achieve the 2010 targets and in order to achieve these targets a deeper understanding of the physical, economical, environmental, administrative and cultural characteristics is required.

As a result of some of the influencing factors, there are still some elements missing if the strategy is to result in a sustainable integrated waste management system. The UK as a whole requires more integrated waste legislation, as currently about five hundred pieces of legislation apply to waste management. The Welsh Assembly cannot achieve integration for Wales without the UK Government. A successful integrated waste management system also requires better integration with the planning system and currently this is not the case in the UK, and once again the Welsh Assembly cannot achieve this without the UK Government. Integration with the planning system, for example, should require that waste management systems be a prerequisite of new developments. Any new initiatives should be required to provide details of how they will manage waste production.

In relation to data collection numerous organisations collect data in Wales and companies are becoming increasingly unresponsive due to the amount of business time they have to provide to such activities. There has to be some co-ordination of

these activities, as not only would this reduce the number of surveys being undertaken but it would provide a co-ordinated set of data for a variety of purposes.

Monitoring and accountability also need to become integral parts of the waste management system to support continuous improvements. Constant auditing of systems is vital to ensure that problems are identified and rectified as soon as possible. This includes monitoring the amounts of recyclable recovered. Local, community based solutions should include active informed consultation with the relevant communities. This would improve intelligence on assessing demands and needs of users at a community level.

The Welsh waste strategy does provide a guide to improving waste management within Wales and it is providing significant levels of funding to achieve its goals. The findings of the 2003 Commercial and Industrial Waste Production Survey indicate that there is still a considerable amount of work to be undertaken for the targets to become a reality, as much more attention needs to be taken of the geographical factors influencing implementation before success can be achieved.

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