Mapping the sustainability of small business locations

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Small to medium enterprises (SMEs) account for 63.7% of employment, 99.7% of employers and 53.8% of the economic turnover in the south west region (Department for Business Enterprise and Regulatory Reform 2008). Their involvement in long-term sustainable economic development is therefore significant. Empirical research into the needs and decision-making of SMEs is limited, with existing literature and guidance relating mainly to larger businesses and large office premises. This research seeks to understand office location decision-making by small businesses at the local scale in the Bristol city-region and to analyse the sustainability of their office locations. This will provide insight into the economic, environmental and social sustainability of current economic growth and will evaluate the current spatial planning policy framework, in order to help identify what is required for sustainable economic development in the future.

An online questionnaire has been completed by 215 SME office users in the Bristol city-region. The most important factors when choosing a location are cost, floorspace and broadband availability. Analysis of the comments made by respondents, however, reveals a strong behavioural rationale behind location choices and a more complex approach to decision-making than that of larger businesses. Only a few businesses have adopted the alternative business model of the 'virtual office', where location is less relevant. Spatial analysis has been carried out in a geographic information system (GIS) to understand the accessibility of office locations to public transport networks and nodes, and to services and facilities needed by businesses. Results suggest that existing premises may not be in sustainable locations according to current guidance. Mapping the 'softer' factors of decision-making, such as 'quality of life' criteria is complex, and current methods for assessing sustainability may not be appropriate for this. The findings of this research have implications for future spatial planning policy, current assessment methods, encouraging the growth of small businesses and preparing for sustainable growth in the future.

Keywords: Bristol city-region, accessibility, geographical information systems, small to medium enterprise, sustainability assessment

1 Introduction

Small to medium enterprises (SMEs, businesses with fewer than 250 employees) account for 63.7% of employment, 99.7% of employers and 53.8% of the economic turnover in the south west region (BERR 2008). Their involvement in long-term sustainable economic development is therefore highly significant. The need for an office premises is a requirement of the majority of SMEs with employees, but the sustainability of these actual office locations (rather than the building itself) is not well documented. The location of an office building will impact upon carbon dioxide emissions, travel behaviour, employee well-being, client/customer contact, general accessibility and overall business success. This will influence the sustainability of economic development at the local level, but also in the wider context. Furthermore, empirical research into the needs and decision-making of SMEs is limited. Understanding location decision-making by businesses and the sustainability of the locations that are being chosen may help the region prepare for sustainable economic development in the future. The research is informed by an online survey of 215 SMEs and the spatial analysis of data in a geographic information system (GIS).

2 Research aim

This PhD research (in progress) aims to understand office location decision-making by SMEs at the local and sub-regional scale in the Bristol city-region (Figure 1). The sustainability of office locations is analysed, building on (and evaluating) current literature, guidance and debates in the field. This will reflect on the economic, environmental and social sustainability of current economic growth for small business in the area, provide insight into implications for the future and evaluate the current spatial planning policy framework.

3 Office location and the sustainable city-region

Empirical research seeks to explore what influences business location in order to understand behaviour and process, to assess economic activity in the past and make predictions for the future, to evaluate previous policy approaches and ascertain what is required for the future. By understanding what is required from an office location, business needs can be understood, office premises can be developed appropriately and Government policy can be based on empirical findings. This is a requirement of planning policy in England referred to as 'evidence-based' policy, with the new system of Local Development Documentation requiring 'a robust, credible evidence base' in order to meet planning requirements (ODPM (now CLG) 2004: 1). It is evident that traditional theory of business location is not sufficient to help understand the location of office activity. Empirical evidence must be gathered and assessed in order to understand what decisions businesses are making on to try to understand why. By gaining this knowledge, the development of future policy can be more aligned with businesses needs and will allow an insight into the requirements for a more sustainable form of economic growth. Much empirical research has been conducted into location decision-making of businesses at the different stages of start-up, expansion and relocation. The majority of this work has focused on large businesses, meaning that comparable studies on smaller businesses are rare, despite the contribution they make to the economy and the potential environmental impact they may have. In order to understand what must be done

to encourage sustainable economic growth, factors influencing business decisions regarding locations must be explored.

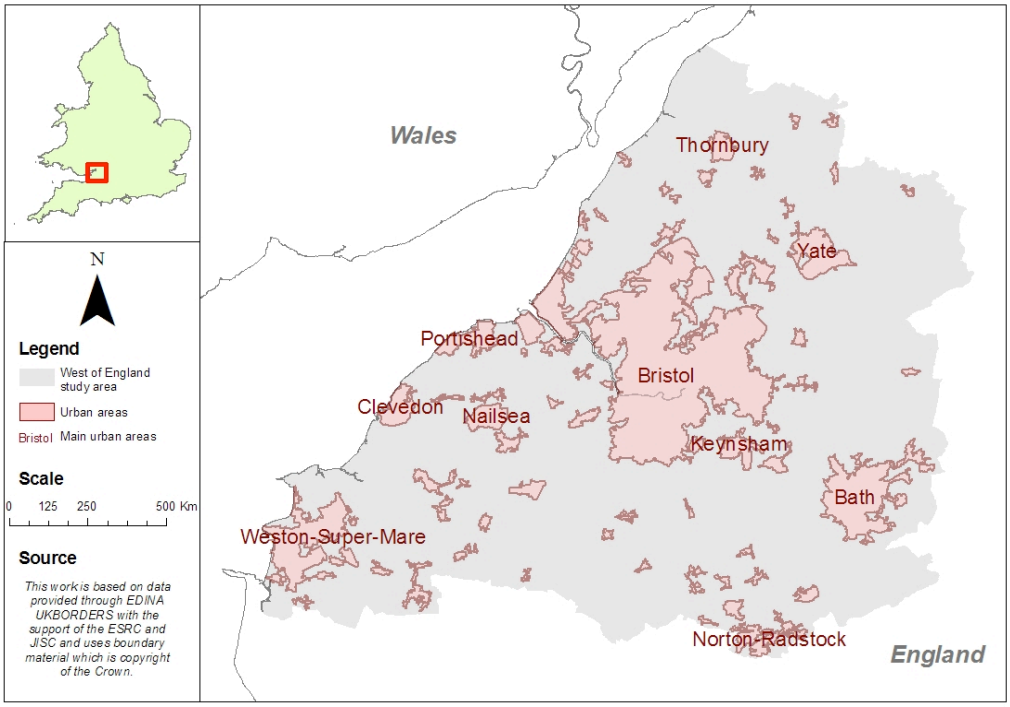

Figure 1. The West of England study area and associated urban areas

The city-region provides a suitable scale of focus to examine economic activity (Ravetz 2000; Green 2005). There is a need to understand current economic activity to enable successful future planning, particularly in city-regions. A recent report to national Government noted that 'rapid economic change had overtaken the working assumptions of urban planners and economic development officers alike' (Townsend and Tully 2004: 3). It was recommended that research be conducted to ascertain which businesses are 'amenable to different kinds of sites within a City Region' (ibid, p 4). The city-region incorporates the city centre, surrounding suburbs, surrounding towns and rural areas. This scale of analysis is essential for 'joined-up thinking' as the city cannot be viewed in isolation (Ravetz 2000). The whole area should be considered to links between local, regional, national and even the global scale (Ravetz 2000). This is particularly evident with needing to coordinate solutions to housing, workplace location and transport networks (Green 2005).

The following sustainability objectives have been taken from Ravetz (2000: 9). These are seen to realistically represent the process of sustainability in the context of economic development in the city-region.

- Environment: reduce environmental impact and resource use to 'sustainable' levels, and enhance environmental quality and safety.
- Economy: to enhance long term resilience, competitiveness, employment, and equitable distribution of resources.
- Society: to enhance health, education, security, equity, cohesion, diversity and 'quality of life'.

The importance of good access to public transport networks is crucial in order to reduce car dependence and make sustainable transport options available to those using office premises (Stead 2000). The 'social sustainability' angle is important too, in order to maximise the quality of life both for the staff employed by the company and the wider community. This in turn impacts on the business as recognised by Sayce and Ellision (Sayce and Ellison 2003; Sayce and Ellison 2004; Sayce, Ellison et al. 2004), in that staff retention is clearly affected by the accessibility of the business premises. Harvey (2007) notes that a 'human-centric perspective' is crucial rather than focusing on 'green' goals, particularly as the cost of hiring staff is the major expense for small businesses. This agrees with research showing that while businesses are keen to invest in 'raised staff satisfaction' and 'improved company image', they are 'only prepared to pay marginally more to occupy an environmentally efficient property', suggesting that the benefits to business are much greater from the social sustainability angle (GVA Grimley 2006). What exactly constitutes 'accessible' and which criteria should be considered has been widely discussed, as outlined in Table 1. This guidance can be used to identify accessible areas for future developments and can also be used to evaluate existing developments. Based on this review of the literature, it can be deduced that an office should be within a maximum distance of 1000m of a railway station or 650m of a bus stop in order to meet sustainable accessibility targets regarding public transport. This can be analysed by mapping accessibility information and modelling distances in a GIS, providing an insight into which office premises (existing and potential) are located in potentially sustainable locations and which are not.

Table 1. Sustainable location criteria in the literature

Organisation	Date	Assessment	Sustainable location criteria
Building Research Establishment (BRE) (UK)	2008 (revision)	Environmental Assessment Manual for offices (BREEAM)	Frequency of public transport within 650m of the office building for bus stops and 1000m for railway stations (TRA1); where the building is located within 500m of a grocery shop and/or food outlet, Postbox and cash machine (ATM) (TRA2)
London Borough of Hammersmith and Fulham (UK)	1992	Public Transport Accessibility Level (PTAL) system	8 minutes to/from a bus stop (640m) and 12 minutes to/from a train station (960m)
Green Building Council (USA)	2005	Leadership in Energy and Environmental Design Green Building Rating System™ (LEED)	800m from a commuter rail, light rail or subway station; or 400m from two or more public or campus bus lines suitable for employee use
South West Regional Planning Guidance (RPG10) (UK)	2001	Interim Transport Accessibility Criteria (Annex A: Accessibility and Parking Standards)	300m target distance, 600m maximum to a food shop and primary school; 600m/1000m to other non-residential facilities; 200m/400m to a bus stop; 600m maximum to a bus station; 800m maximum to a railway station; plus maximum travel times
Department for Transport (DfT) (UK)	2004	Accession	30 minute maximum time for accessing various facilities and workplace by public transport
Griffith University's Urban Research Program, Australia (Pitot et al. 2006)	2005	Land Use & Public Transport Accessibility Index (LUPTAI) Tool	5 minutes to/from a bus stop (400m) and 10 minutes to/from a train station (800m)

4 Research questions

Based on a review of existing literature and the current state of knowledge in this field, three research questions have been established for this research:

1. What determines the locations of office-based SMEs in the West of England?
2. What is a sustainable location for office-based SMEs in the West of England?
3. Are SMEs choosing sustainable locations for their office premises?

The following section will provide an overview of the research strategy used to answer these questions.

5 Research design and method

5.1 Definition of terms

Exploratory face-to-face semi-structured interviews with businesses (summer 2007) revealed that staff well-being, proximity to facilities and accessibility are the most important factors for economic success. In consultation with relevant literature, a sustainable location for an office-based SME is defined as maximising workplace quality of life and accessibility while resulting in minimal environmental impact. For a location to be environmentally sustainable it can be argued that it must be accessible by public transport, in order that carbon dioxide emissions can be reduced. For a location to be sustainable for the business, the office may need to be accessible for employees, to clients and to a range of facilities and services.

5.2 Sampling procedure

Businesses were selected from the Financial Analysis Made Easy (FAME) (Jordans Limited 2008) database of registered companies. A total of 1025 met the following eligibility criteria: A live SME (EC classification including micro, small and medium enterprises); at least one employee; a non-retail office premises (based on Standard Industry Classification (SIC) 2003 codes); in the West of England (Bath and North East Somerset, Bristol, North Somerset and South Gloucestershire); contactable by post or email (with addressee and address detail). A saturation sampling method was deemed necessary, where all identified eligible respondents would be contacted. This was particularly important when considering that not all SMEs are actually included in the database of registered companies. In fact, at the start of 2007 there were 417,910 enterprises in the south west according to BERR (2008), but according to FAME, there are currently only 324,146, just 77.6% of the total. However, this was the only realistic way of identifying and accessing information on individual companies and being able to obtain their details. The size of the sample ensured that it was feasible to invite all businesses in the sample to participate.

5.3 Business survey

An online questionnaire was used to collect responses from the selected businesses. This method was deemed most appropriate due to the sample size, a need to obtain quantitative data for comparison purposes, the assumed Internet accessibility of respondents and the constraints of time, resource and cost. The questionnaire was pre-tested then piloted on six of the businesses. Feedback from the testing process recommended the addition of response options and amendment of some of the question formats. In order to maximise the response rate, a variety of measures were taken based on guidance provided in the literature (Tomaskovic-Devey 1994; Anderson and Gansneder 1995; Dillman 2000; Bartholomew and Smith 2006). This included explaining the subject and purpose; emphasising the importance of, and to, the West of England sub-region; informing the respondent of sponsorship by the South West of England Regional Development Agency (SWRDA) and academic institutions of the University of Bath and UWE; using personalised contact wherever possible; providing an incentive (to express their views and to obtain summary feedback regarding other businesses); legitimising the research (sponsorship, logos and UWE email address or headed paper) and providing contact details; allowing respondents the choice to complete the questionnaire online, by post or via email; using a personalised subject line for the email invitations and individual addressee details for the postal

invitations; sending invitations on a Monday or Tuesday; and ensuring the request was sent to the most suitable person.

Respondents were asked a series of questions including: where their office was located; which factors were important when choosing their office location from a pre-specified list; where their employees were located; modes of travel to work; and the perceived advantages and areas of improvement for their current office location. Each non-respondent was sent three follow-up notifications.

The questionnaire was completed by a total of 215 eligible businesses out of the sample of 1025, a response rate of 21%. The low response rate was expected due to the often quoted difficulty of conducting surveys of small businesses (Dillman 2000; Lewis et al. 2007). In fact, this is identical to the average response rate of calculated from published journal articles in the 1990s (Paxson 1992 cited in Dillman 2000: 323). There was a disproportionate non-response by micro companies, where 84% of invites went to micro companies, but only 46% of responses were received by them. This was deemed a sufficient response not to warrant booster sampling or grossing up as the response were not designed to be representative.

The data had to undergo a thorough cleansing process prior to the analysis stage. Only 215 of a total of 330 respondents who accessed or completed the questionnaire were eligible. In part this was due to the inability of assessing eligibility of respondents prior to contact. For example, a business may have a registered address in the study area of may be located elsewhere; they may have changed since submitting information to the database (address, name, number of employees), they may not have an office premises that they use; they may have merged with another or ceased operation; and information in the database may have been incorrect. Some organisations provided duplicate responses where more than one individual had started or completed the survey, and some responses were not complete.

5.4 Data analysis

The data analysis stage of this research is ongoing and two main aspects of this have been, or will be, completed. One aspect involves investigating and spatially analysing the responses received from the survey (research question 1). The second aspect concerns mapping the sustainability of locations and office buildings in the study area based on the literature, including sustainability assessment criteria such as BREEAM (BRE 2008) and validated by the empirical research (research question 2). The results of these will inform the discussion concerning sustainable decision-making by SMEs (research question 3). These are discussed below.

5.4.1 Business survey

Descriptive statistics have been extracted from the responses based on the quantitative responses regarding important location criteria, and qualitative responses of perceived advantages/areas needing improvement regarding the office location of SMEs.

The office locations of the business respondents have been georeferenced based on postcode information using Ordnance Survey Code Point® data, then mapped in a geographic information system (GIS). In order to analyse employee locations relative to the office location, the distance that employees travel to each office location is being analysed. This has been based on straight line distance (using 'Hawths Analysis Tools for ArcGIS', Beyer, 2004), road distance and rail distance

(using Network Analyst OD Cost Matrix facility in ESRI's® ArcMap™ 9.2, based on the Ordnance Survey Meridian2 transport network). This will reveal specific travel to work areas at the individual business level. By using information provided regarding mode of travel, it may be possible to indicate the carbon dioxide contribution of SME office users in the sub-region.

5.4.2 Office location sustainability

Locations within the study area have been analysed in terms of sustainability for office premises. As discussed in Section 3, various methods for assessing sustainability have been developed as guidance for development. The initial stages of the analysis have mapped the criteria set in RPG10 and the distances specified in the recently revised criteria by BRE (August 2008) as part of the Environmental Assessment Method specifically for offices (Table 1). The BRE method attributes credits to an office premises based on satisfying specific sustainable transport criteria. National Public Transport Access Nodes (NaPTAN) data from the Department for Transport were used, mapping the locations of bus stops, railway stations and bus stations. Valuation Office Agency (VOA) data was used for RPG10 to identify various services (GPs; schools – nurseries, primary, secondary; opticians; dentists; pharmacies) and facilities (shops, childcare, supermarket, pubs, leisure, religious, other social); and for BREEAM to identify the location of cafes, banks, food shops, ATM's and Post Offices. Royal Mail data was used to identify Postbox locations. The Network Analyst OD Cost Matrix facility in ESRI's® ArcMap™ 9.2 was used on the road network extracted from Ordnance Survey Meridian2 to calculate 'service areas' for public transport nodes (points) and services/facilities, using the maximum distances as specified in the BREEAM and RPG10 criteria. This gives a general indication of how sustainable a location can be.

BREEAM is designed to be carried out at the individual property level, not for assessing a wider area; therefore calculating general 'service' or 'accessibility areas' is not so appropriate. VOA data and respondent information identified a total of 7522 office premises in the study area. The sustainability of each of these locations is currently being analysed to calculate actual distances from offices to public transport nodes (points) and services/facilities nodes. This will calculate an Accessibility Index as defined in BREEAM, using the Public Transport Accessibility Level technique (Appendix B, Transport for London 2006). OpenStreetMap data is formatted and validated for use to supplement the Ordnance Survey data, in order to calculate accurate walking distances based on all pedestrian routes as well as road networks. Public transport frequency data is being compiled using the National Public Transport Data Repository (NPTDR) (Thales 2009), to assess the quality of services available at public transport access nodes. This gives a specific indication of how sustainable a particular office building could be.

Mapping BREEAM criteria is problematic for multiple locations. Postbox information exists in a PDF from the Royal Mail but only 14% of boxes have full postcodes (and there are nearly 3000 Postboxes with Bath and Bristol postcodes). The rest are just the higher level (BS1 and so forth), requiring manual georeferencing using the street name to map the locations. In elation to cash machines, it should be noted that money can be obtained from locations other than ATMs, such as Post Offices and shops that offer 'cash back'. Identifying grocery shops and food outlets is almost impossible to obtain accurate data for. Sandwiches and so forth can be bought from a vast range of shops that are not included as specific cafes/food shops by the VOA. Shops and kiosks are not

specified according to type of product sold. Manual survey would be required to identify each location, but these would be constantly changing. It is questioned whether it is possible to use proxies for the criteria. As an example, density mapping was carried out for all services in the VOA database to identify areas that had the highest clustering of such facilities (the top quartile) for RPG10 guidance (Figure 8) and is currently underway for BREEAM guidance. It appears that this may also be a more accurate reflection on services and amenities used by staff, rather than using the criteria specified in TRA2. In order to verify if this approach would be appropriate, site validation is being carried out for a small sample area in the Bristol city-region.

Gravity modelling has been used to examine the relationship between office location, sustainability factors and employee location. The Keeble et al (1981) gravity modelling concept is based on the principle of the 'economic potential' of an area being a function of its attractiveness and of its proximity to other urban areas (Copus 1999). For example, the economic potential of Bristol is the sum of the size of each other urban area divided by its distance to Bristol. The model is used in this research to assess the suitability of areas in the Bristol city-region for office locations, and to assess the influence of accessibility on the suitability of these areas. Gravity models have been said to represent over-simplified models of reality using just functions of size/attractiveness and distance. However, by weighting locations according to the calculated accessibility indices, the model can more accurately reflect differences in location.

The sustainability ratings attributed to office buildings is analysed, comparing different classification systems, assessing the sustainability of office stock in the study area and evaluating the location of actual office location. Survey responses regarding advantages and needed improvements of their office locations, will be compared to the indicative sustainability rating of their building. This will allow an insight not only into the sustainability of office locations used by SMEs, but also into the appropriateness of sustainability rating systems, suggesting if the criteria are valid for SME office users.

6 Results

Results are provided here from the initial findings of the analysis, based on the three aspects of analysis detailed above.

6.1 Business survey

Quantitative data collected from the survey reveals that factors of cost, floorspace and broadband availability are most important when choosing an office location (Table 2). This is based on the mean score of the variables, a method used to find the most and least important factor using the variable scale.

Interestingly, analysis of the comments made by respondents regarding the advantages of their location and areas for improvement, suggests that these factors may not be as important. Factors relating to transport and accessibility were most frequently mentioned, accounting for nearly 50% of all responses. Proximity to city/town centre was the most frequently mentioned advantage of respondent's office location (mentioned 60 times, equivalent to over 10% of all responses). Respondents mentioned various aspects of being near to a town centre, including amenities, ease of access, atmosphere, centrality and quality of the surroundings. Local environment was the most frequently mentioned factor that the respondents would like to see improved at their office location (mentioned 62 times, equal to

over 17% of responses). Respondents mentioned various aspects of their local environment, including: air quality, street cleanliness, amount of green space, signage, noise, drainage and the 'public realm' generally.

In terms of travel to work results, 53% of employees travel to the office by car and 44% travel by public transport, bicycle or on foot (Figure 2). Even though the data collected as part of this research is not designed to be representative of all businesses in Bristol city-region, the figure of 53% is close to the figure of 56.5% quoted by the Office for National Statistics in 2007 for this area (ONS 2007). The ONS also publish data regarding average distance travelled to work. This is being calculated using responses to the survey regarding employee locations and spatial analysis as outlined in Section 5.4.

Table 2. Mean scores of location variables from the survey of 215 SME office-users in the Bristol city-region

Factor	**Mean score of variable (1 = very important)**	**Rank of variable**
Cost of premises	1.57	1
Floorspace	1.58	2
Broadband Internet availability	1.66	3
Access by car	1.75	4
Proximity to employees	1.90	5
Director's personal preference	2.11	6
Environmental quality of surroundings	2.21	7
Safety/crime levels	2.33	8
Access by public transport	2.44	9
Prestige of location	2.47	10
Access to customer/client	2.63	11
Access to shops and restaurants	2.79	12
Proximity to similar business	3.16	13
Proximity to university	3.50	14

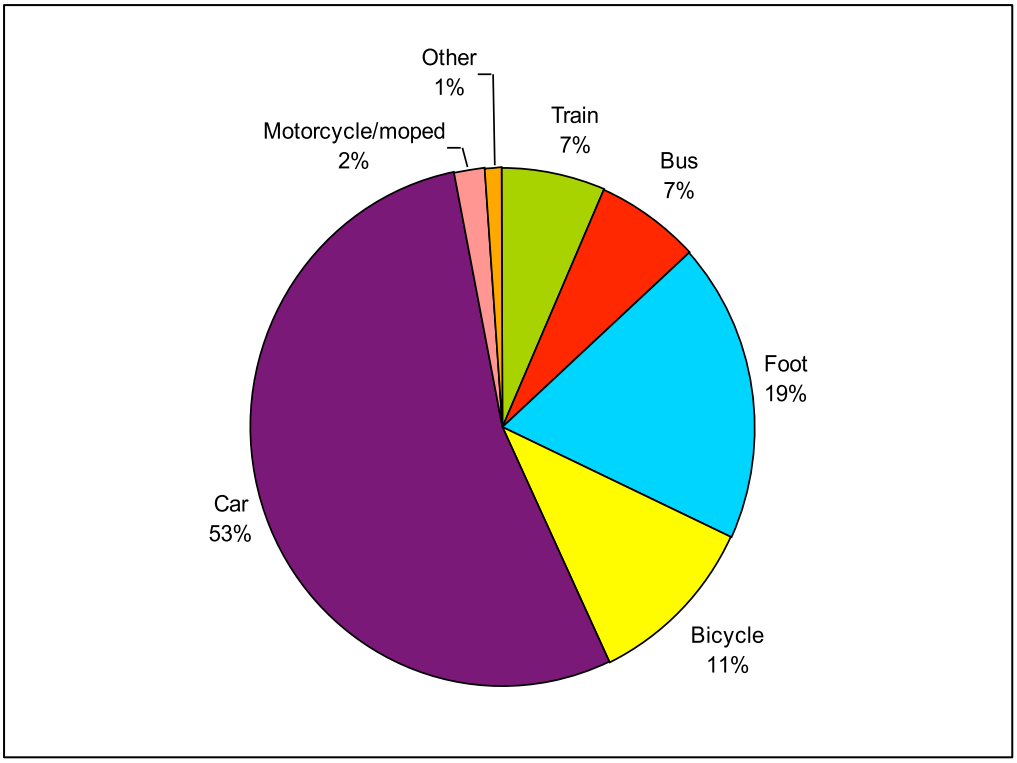

Figure 2. Mode of travel to work of employees working at the offices of the 216 businesses surveyed

6.2 Location sustainability

Figures 3 to 5 provide an example of the initial analysis of the sustainability of locations in the study area, based loosely on criteria specified in the recently revised BREEAM criteria. Figure 5 shows that only a relatively small area of Bath would achieve the highest number of credits for sustainability, based on the 'service area' of the train station and bus stops. Offices existing outside of this area would be assumed less sustainable, or perhaps unsustainable. However, this is only indicative based on initial outputs of the analysis, using road network data and not including service frequency data. To assess sustainability, accessibility indices need to be created for individual office locations (Section 6.3), in order that the full criteria specified in the guidance can be used. Once complete, a thorough evaluation of the sustainability of areas will be made.

Initial gravity modelling assessment shows which urban areas in the study area perform better than others in terms of sustainable accessibility. Figure 6 shows that some peripheral urban areas such as Weston-Super-Mare actually perform better than would be expected of their location based on good public transport provision and service/facility availability. Areas such as Portishead actually perform worse than expected, and this is due to the absence of a railway station as this location. This method could be used to identify regional issues of peripherality and poor transport/service provision.

Accessibility of office buildings was initially mapped according to RPG10. This indicated that 16.4% of office buildings in the Bristol city-region meet the public

transport accessibility criteria outlined in the Regional Planning Guidance (only 15.7% in the Bristol city urban area) (Figure 7) and that 55% offices are located in areas with the highest density (quartile) of services and facilities (Figure 8). The analysis shows that the criteria set out in RPG10 are very rarely met. 3726 of the 4420 offices in the Bristol urban area (84%) do not fall within even the maximum, let alone the target accessibility in terms of walking distance from a station and a bus stop. It must be noted that these criteria are not used in the replacement Regional Spatial Strategy for the region, perhaps suggesting they were not realistic. It is also noted that this method differs from BREEAM by producing a 'yes' or 'no' answer to meeting targets, whereas BREEAM rates locations using a scale of accessibility (very poor to excellent) to assign sustainability criteria.

Accessibility indices are being created for all office buildings in the Bristol city-region according to criteria specified in BREEAM. Early results from the analysis suggest that a higher number of offices in the study area will achieve higher sustainability ratings, as the criteria are more lenient. In BREEAM, the maximum walking distances are higher, transport facilities are fewer and the chosen services are generally frequently located near most office clusters. As a result, urban locations receive high ratings. The current analysis uses recently available street network data, as opposed to the road network data used for initial analysis. This allows a more realistic assessment when analysing accessibility, as it includes additions such as pedestrian walkways, footbridges and other crossings.

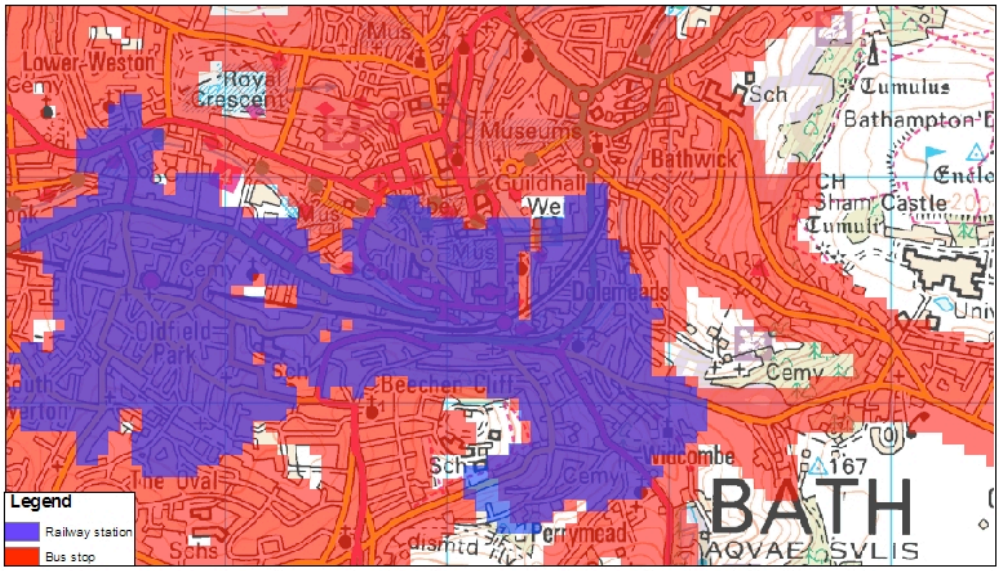

Figure 3. Accessibility to public transport in Bath, Somerset: areas within 1km of railway stations and 650m of bus stops (loosely based on BREEAM criteria)

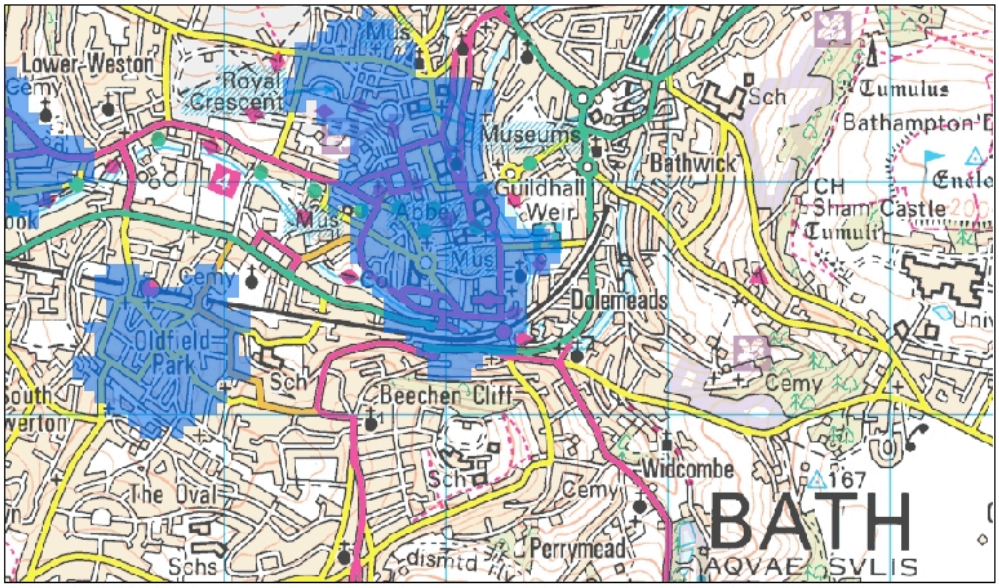

Figure 4. Accessibility to services and facilities in Bath, Somerset: areas within 500m of a food shop, cash point and Postbox (loosely based on BREEAM criteria)

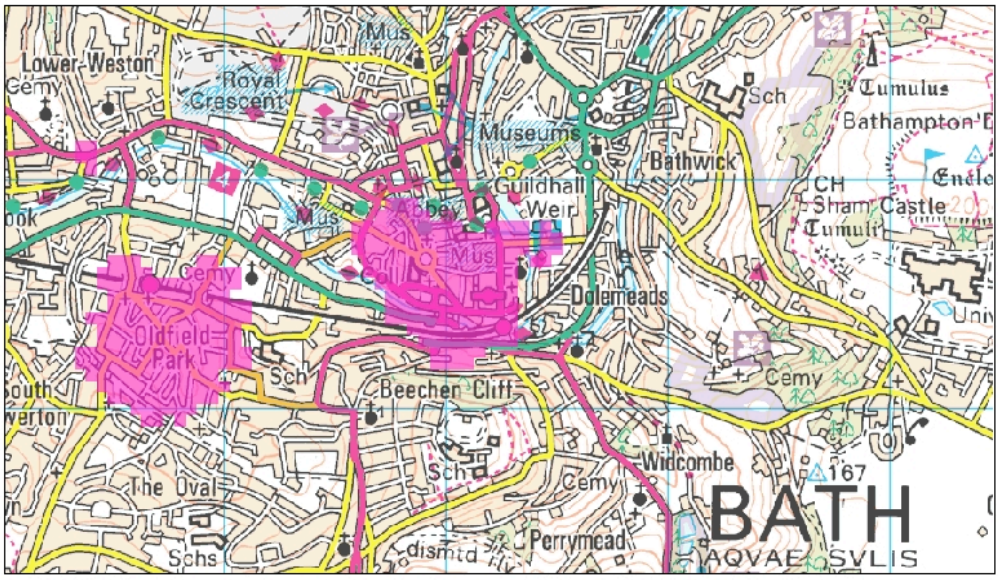

Figure 5. Most sustainable locations for offices in Bath, Somerset: combining the above transport and service accessibility maps (loosely based on BREEAM criteria)

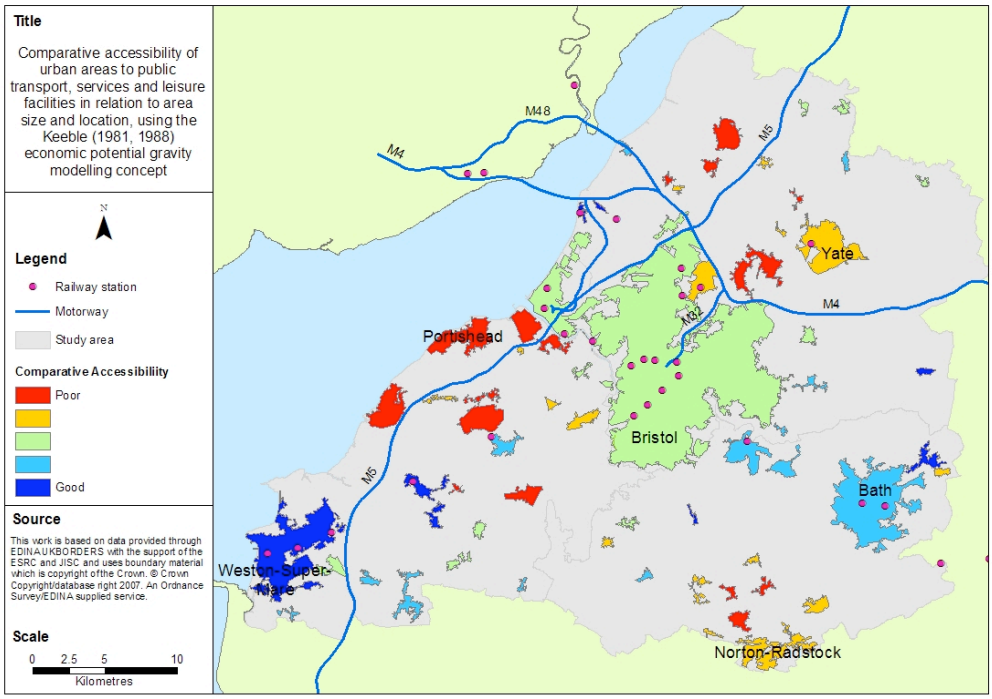

Figure 6. Analysis of the economic potential of urban areas weighted by availability of public transport, service and leisure facilities

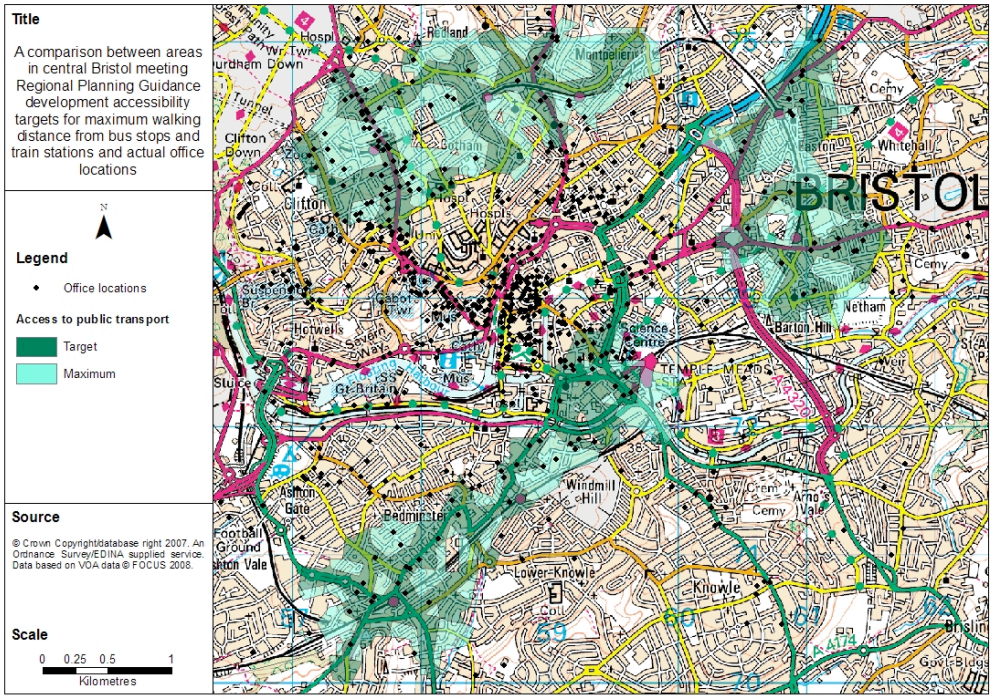

Figure 7. Analysis of accessibility to public transport in the Bristol area according to RPG10

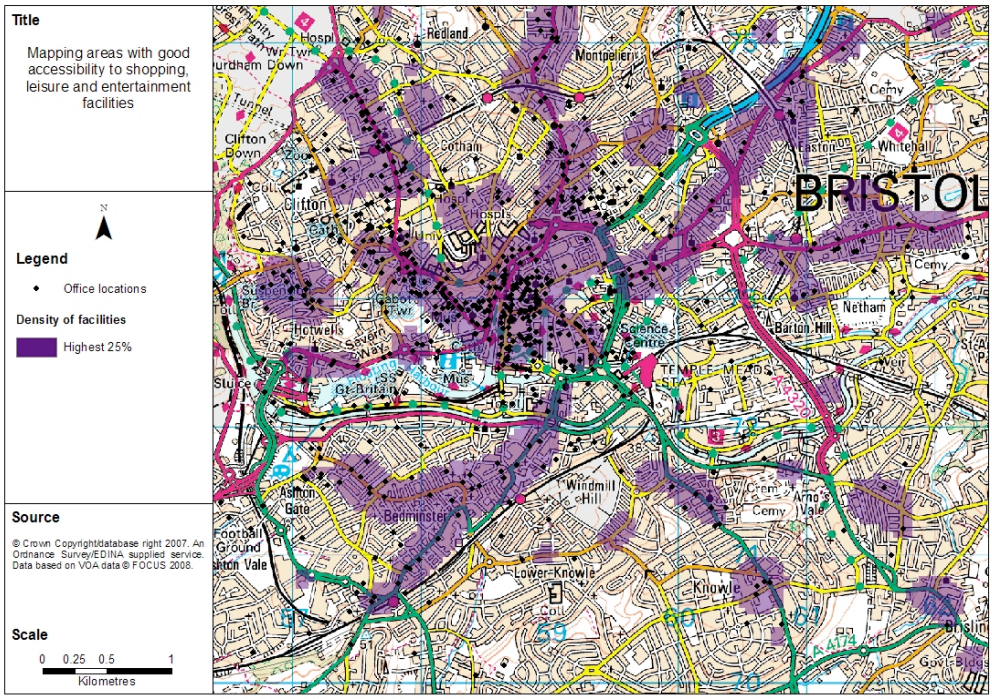

Figure 8. Analysis of accessibility to services and facilities in the Bristol area according to RPG10

7 Discussion and policy implications

A sustainable location for a SME is one that offers maximum accessibility and 'quality of life' related factors for the employees. Adding in the dimension of access to public transport provides a more sustainable location in the wider environmental context. SMEs may be choosing sustainable locations to an extent, as many businesses succeed and many of them are located in accessible locations with good levels of facilities and quality of life aspects for their employees. In the initial stages of business, a new start-up company prioritises cost as the main determinant of their own ability to sustain the business. As the company increases in size, staff quality of life becomes an important consideration. Environmental sustainability is often not a direct consideration, but by desiring to locate near to public transport connections for staff and client accessibility, these conditions may be fulfilled. Spatial analysis of office locations suggests that existing premises may not be in sustainable locations according to current guidance and many of the offices in the West of England are not 'accessible' particularly in relation to rail transport. Therefore businesses do not always have the choice of being in a sustainable location, especially as these locations may command high rents. This has policy implications and needs to be a key consideration in the creation and adaptation of buildings to be used as office premises.

Mapping the 'softer' factors of decision-making, such as 'quality of life' criteria, is complex. Crucially, it has been difficult to accurately reflect the criteria adopted by BREEAM on an area-wide scale. Also, the criteria used may not accurately reflect what is required by smaller businesses to enable their sustainability. This suggests that current methods for assessing sustainability may not be appropriate. The criteria used in existing sustainability assessment measures should be questioned, for example, in relation to the inclusion of Postboxes. It is included as one of three

criteria to measure sustainability of office locations by BREEAM, but only one of the SMEs surveyed mentioned this as a criterion, suggesting that this may not be important to business. The survey revealed that a range of services and facilities are important to SMEs, so it may be more appropriate to use a measure estimating the density of services in general.

This analysis could be used to advise where additional infrastructure is required in terms of transport. This shows that offices are not located near sustainable transport therefore local level planning policies cannot get business to locate more sustainably as there simply are not the offices within these locations. Either more offices need to be built/extended in the accessible locations or the public transport infrastructure needs to be improved.

Although the analysis phase is still in progress, the research reveals that the heterogeneity of SMEs results in a more complex approach to decision-making than that of larger businesses. Following further analysis, results from the survey will help to shed light on where businesses want to locate and how important sustainable accessibility is to them.

The findings of this research have implications for future spatial planning policy, current sustainability assessment methods, encouraging the growth of small businesses, and preparing for sustainable growth in the future.

Upon completion of accessibility analysis using the street network, further stages of the research will include two additional components. Firstly, using the gravity model concept to consider actual employee locations to identify the optimum location for an office premises would be. This is based on the locations of the employees, factors quoted as important by businesses, using the road network and then a sustainable accessibility network. Secondly, correlation analysis will be carried out in order to compare rateable values of office locations with sustainability values to assess the relationship between quality of life, accessibility, sustainability and the value that the office commands.

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