Is Sustainability Attractive for Corporate Real Estate Decisions ?

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Abstract. *This paper provides an analysis of the impact of sustainable principles on corporate property decisions and attractiveness for business districts in the French context. It is based on a behavioural survey conducted across a large sample of corporate property managers and a MCA approach which highlights key factors about the influence of sustainable principles among traditional determinants of territorial attractiveness. This approach allows us to draw up a typology of actors regarding the diffusion of sustainability issues. It emphasizes a general improvement of sustainability on location choice especially for listed companies, owners of their head office and companies located into the main business districts of the Paris metropolitan area.*

Keywords. *Sustainable City; Corporate Real Estate Management; Territorial Attractiveness; Office Business Districts.*

Résumé. *L'objectif de cet article est de montrer que le développement durable impacte le secteur de l'immobilier de bureau et l'attractivité des quartiers d'affaires. Il repose sur les résultats d'une enquête menée auprès des directeurs immobiliers de grandes entreprises en France afin de capter le point de vue des « grands utilisateurs » sur les enjeux de durabilité urbaine. Ces résultats sont exploités à l'aide d'une Analyse des Correspondances Multiples permettant de dresser une typologie des acteurs en fonction de l'impact du développement durable sur leurs stratégies. Cette analyse fait particulièrement ressortir l'impact des enjeux de durabilité sur les choix de localisation et l'attractivité des territoires pour les entreprises cotées, propriétaires de leur siège social et localisés dans les principaux centres d'affaires parisiens.*

Mots clés. *Ville Durable ; Management de l'Immobilier de Bureau ; Attractivité des Territoires, Quartiers d'Affaires.*

JEL Codes. *C38; C83; R12; R33.*

1. Introduction

This paper analyses the improvement of sustainable principles into corporate property decisions and its impact on attractiveness for business districts. Sustainable development has become a major societal issue since the report of the Brundtland Commission (1987). The improvement of sustainable principles

influences urban planning and academic research by promoting the emergence of a sustainable city (Nijkamp and Pepping, 1998; Whitehead, 2003; Kenworthy, 2006) as a city minimizing its impact on environment and ensuring quality of life and social cohesion for its inhabitants. Property and building sectors play a key role in order to achieve a sustainable city because of their ecological footprint due to energy consumption and greenhouse gas emission (Nappi-Choulet, 2009) and their influence on the city's organization. As a consequence, property sector has been specifically targeted by recent environmental regulations such as *"Grenelle de l'Environnement"* in France and sustainable development has become a major issue for corporate property, influencing management practices and strategies. The improvement of sustainability issues into practices of the main actors of corporate property relies on the context of *corporate social responsibility* or *sustainable responsible business.*

The improvement of sustainability issues into corporate property strategies can firstly be interpreted as an adaptation of the main actors to an increasing regulation constraint, but these actors also consider the potential value created by sustainable performance of buildings which improve their attractiveness. Following this, a growing literature aims at measuring the economic value of sustainable or green buildings for investors and landlords (Francesco, Levy, 2008; Miller, Spivey and Florance, 2008; Fuerst and McAllister, 2009; Eichholtz, Kok and Quigley, 2010; Wiley, Benefield and Johnson, 2010) but fewer researches analyse the attractiveness of sustainable buildings for users. However, the improvement of sustainability issue in corporate property does not concern only buildings' performance. Sustainable principles may have consequences on the environment where those buildings are located by influencing land-use, city's organisation and urban form. In the context of corporate property, this may improve attractiveness for business districts by promoting sustainable attributes (green buildings, local amenities…), land-use diversity and accessibility.

The determinants of attractiveness for business districts are a major issue for corporate property, especially in the context of globalisation of the property market. The objective of this paper is to demonstrate that sustainable issues impact attractiveness for business districts by influencing location decisions of the firms. The study focuses on managers of corporate property for large companies located in France in order to analyze the behaviour and motives of office buildings' users regarding sustainability issues. We use a behavioural survey conducted across a large sample of corporate property managers in order to investigate the impact of sustainability on management practices and location strategies. The results are interpreted using a Multiple Correspondence Analysis (MCA) approach which allows us to identify key factors reflecting the improvement of sustainability on corporate property and to draw up a typology of actors regarding the influence of sustainability on their location strategies. A similar method

is used by Nappi-Choulet (2006) to study the behaviour patterns and motivations of active private investors and developers in the French commercial property markets, and their involvement in urban regeneration initiatives, thanks to a behavioural survey and MCA approach. We adapt this method in order to emphasize the improvement of sustainability issues into corporate property strategies.

The paper is structured as follows. Section 2 reviews the relevant literature examining the impact of sustainability on corporate property strategies and attractiveness for business districts. The third section presents the context of the study paying particular attention to the reinforcement of environmental regulation and to rating systems which certify buildings for sustainability. This section also provides background knowledge about the main business districts of the Parisian metropolitan area where the companies surveyed might locate. The methodology of the behavioural survey and the MCA are presented in Section 4, while the results and the importance of sustainability for location strategies and attractiveness for business districts are presented in Section 5. Section 6 contains our conclusions.

2. A review of the literature

Sustainable development and climate change issues have become a major concern for several research fields, especially for economic activities, since the Kyoto Protocol was adopted (1997). Property and building sector are key elements in order to achieve the objectives of the protocol. Indeed, sustainable development is becoming a major issue for corporate property, influencing management practices and strategies. These changes represent the actor's adaptation to an increasing regulation constraint and their awareness that sustainable performance of buildings may create value by improving attractiveness. As a consequence, a growing number of academic researches aim at estimating the economic value of green buildings. However, the improvement of sustainability issue in corporate property does not concern only buildings' performance. It may also improve territorial attractiveness with the promotion of sustainable business districts.

2.1. The potential value of green buildings

The improvement of sustainable principles for corporate property emerged with the reinforcement of regulation constraint. The main actors of corporate property initially integrated sustainable principles in order to adapt their strategy to this reinforced regulation. The recent environmental regulation in the French context of our study such as the *"Grennelle de l'Environnement"* is detailed in the next section. However, as pointed by Eichholtz, Kok and Quigley (2010), sustainability concerns methods of production as well as qualities of consumption and attributes of capital investment, it thus "reflects popular concern for environmental preservation, but it may also reflects changes in tastes among

consumers and investors". This is particularly true for corporate property. The diffusion of sustainable development allowed the actors to consider the potential value created by environmental performance of buildings, defined in the literature by the notion of "green value". Sustainable performances of buildings are expected to improve attractiveness and to increase value. The main issue consists in estimating the value premium of these sustainable attributes.

A growing number of empirical works demonstrate that green buildings allow for rental premiums, higher occupancy rates and thus higher asset values (Miller, Spivey and Florance, 2008; Fuerst and McAllister, 2009; Eichholtz, Kok and Quigley, 2010; Wiley, Benefield and Johnson, 2010). This part of the literature is widely developed in U.S, U.K. and Australia which represent 75 % of academic publications (Sayce, Sunberg and Clements, 2010). These works concerns mainly U.S. office buildings that are Energy-Star or LEED certified regarding comparable buildings, using data from the CoStar database and hedonic regressions in order to estimate the impact of label or rating on value (these certifications are described in details in the next section). They all conclude to a positive impact of sustainable certification on value. However, all these authors are realistic in pointing out the very preliminary nature of the linkage. In addition, the "green value" is also estimated in terms of risk and depreciation for investors by protecting buildings against premature obsolescence (Sayce, Ellison and Smith, 2004; Lorenz and Lützkendorf, 2008; McNamara, 2008; Muldavin, 2008). Consequently, improving sustainable performance of buildings should lead to higher values for investors or landlords generally by more than the extra costs to go green (Bartlett and Howard, 2000; Miller, Pogue, Saville and Tu, 2010). All the studies insist on the difficult estimation of the actual value created by sustainable buildings and that it is more a question of depreciation for non-sustainable buildings. The survey conducted by AtisReal (2008) in U.K. highlights potential lower risks and premium values for investors, whereas Myers, Reed and Robinson (2008) suggest a weaker interest for sustainable properties into investors' portfolios in New Zealand.

The value premium is attributed to attractiveness for occupiers due to decreased operating expenses with energy efficiency, or productivity gains and improvement of employees' well-being (Kats, 2003; Robinson, 2005; Yudelson, 2007; Ellison, Sayce and Smith, 2007). A potential occupier will consider these advantages regarding the extra cost of the rent premium. However, fewer works focused on the value of green buildings for users (Heerwagen, 2000; Edwards, 2006; Paul and Taylor, 2008; Dixon, Ennis-Reynolds, Roberts and Sims, 2009; Brown, Cole, Robinson and Dowlatabadi, 2010). The surveys conducted across occupiers by Jones Lang LaSalle (2008) and Cushman and Wakefield (2009) in London, or DTZ (2009) in Paris confirm the improvement of sustainability among other strategic factors

for buildings' attractiveness and a willingness to pay a premium for green-certified buildings from 1-5 % to 10 %.

This article aims at completing this type of approach by exploiting the results of a survey conducted across a large sample of corporate property managers located in France, mainly into Paris region. However, the survey supporting this article aims at investigating a larger scope of sustainability for users of corporate property including green buildings and sustainable business districts' attractiveness.

2.2 Sustainability and attractiveness for business districts

The issue of sustainability for corporate property does not concern only buildings' performance. Sustainable principles may have consequences on the environment where those buildings are located. The achievement of a "sustainable city" is now widely represented in urban planning policy as well as in academic research agenda (Nijkamp and Pepping, 1998; Whitehead, 2003; Kenworthy, 2006; Berke, 2008; Lombardi, Porter, Barber and Rogers, 2011). This highlights the interest of a territorial approach in order to study the implication of sustainable development for corporate property. This kind of approaches often link the question of urban form, transportation systems and regeneration projects to sustainable principles and thus rely on the importance of urban centralities. This raises the interest to study attractiveness for business districts, especially in a context of globalisation of the property market (Nappi-Choulet, 2009).

The traditional determinants of attractiveness for business districts are widely studied in a well-known previous literature. They rely on agglomeration effects with externalities due to localised interactions and needs for face-to-face contacts (Glaeser, Kallal, Sheinkman and Schleifer, 1992; Porter, 1998; Storper and Venables, 2004; Aguilera and Gaschet, 2005); externalities due to proximity with high-valued activities and high-order business services (Sassen, 1991 and 2002; Lacour and Puissant, 1999; Alvergne and Shearmur, 2002; Coffey and Shearmur, 2002; Duranton and Puga, 2005; Guillain, Le Gallo and Boiteux-Orain, 2006). Firms generally consider the advantages coming from agglomeration effects regarding cost and potential congestion of business districts (Fujita, Krugman and Venables, 1999; Fujita and Thisse, 2003). These changes impact the demand of corporate property's occupiers (Gibson, 2003; Lizieri, 2003; Sing and Ooi, 2006).

In this article, we assume that sustainability is a new determinant of attractiveness for business districts. Sustainable development may impact attractiveness for business districts regarding two main types of explanations: the promotion of sustainable attributes for business districts (green buildings, local

amenities…) and their position into the city's organization depending on land-use and transportation system.

The improvement of sustainability issues may first influence territorial attractiveness by the promotion of sustainable attributes. As mentioned above, the interest for green buildings is increasing but sustainable attributes also concern soft urbanism, urban renewal, green spaces, modern equipments and services… These sustainable attributes are well-suited for changes in tastes and consumption modes; they improve quality of life for users and thus territorial attractiveness thanks to local amenities. Brueckner, Thisse, Zenou (1999) pointed out the role of local amenities for territorial attractiveness in order to explain different urban patterns between Chicago and Paris. The presence of modern amenities associated with high-valued metropolitan functions may improve territorial attractiveness which encourages location of high-income population through a *gentrification* process (Decamps, 2011). In this article, we suggest that promoting sustainable attributes in a specific area may encourage local amenities and thus territorial attractiveness. The emergence of sustainable business districts may largely be supported by urban regeneration projects (Nappi-Choulet, 2006) or "mega-projects" (Fainstein, 2009). The potential attractiveness of business districts depends on the ability of these projects to deal with economic interests, traditional determinants of territorial attractiveness such as cost, potential interactions, equipments and services, as well as dimensions of sustainable development.

The impact of sustainability on attractiveness for business districts also relies on city's organization and urban form. The academic research on "sustainable city" originally focused on the interaction between urban form and daily mobility. A first body of works promoted a "Compact City" (Newman and Kenworthy, 1998) in order to reduce urban sprawl which is associated with an intensive use of the automobile. However, the compact city was criticised by several works, underlining its consequences on congestion, pressure on land prices (Gordon and Richardson, 1997; Galster and Cutsinger, 2005) and the emergence of polycentric cities (Giulliano and Small, 1991; Anas, Arnott and Small, 1998; Gaschet, 2001). Suburban employment centres allow households to live close to jobs and commercial facilities and thus impact commuting behaviours (Levinson and Kumar, 1994; Pouyanne, 2006). This result is reinforced when suburban centres are linked by an efficient transportation system (McMillen, 2001). The emergence of business districts characterised by land-use mix and accessibility is a good way to improve sustainability in a polycentric city. Thus the achievement of sustainability is able to improve territorial attractiveness by promoting land-use diversity and accessibility for business centres.

Sustainable development is a major issue for corporate property. It may influence management practices by creating value for buildings and influence location strategies by improving attractiveness for business districts. The survey conducted in this article is investing these aspects in the French context.

3. Background

This article is based on a survey conducted across a large sample of corporate property managers in order to study how sustainability influences management strategies and determinants of location choices in the French context. As mentioned earlier, sustainable principles has been integrated by the actors of corporate property in order to adapt to an increasing regulation constraint and to invest in the potential value of green buildings. The first part of this section summarizes the environmental regulation in the French context of our study and the different rating systems which certify buildings for sustainability. Moreover, sustainability issues may improve attractiveness for business districts as mentioned above. The second part of this section highlights location of business districts in the Paris metropolitan area. It allows us to identify in our sample which companies are located in one of the major business districts of the Paris metropolitan area.

3.1. Environmental regulation and certification for sustainable buildings

The improvement of sustainability issues into practices of the main actors of corporate property relies on the context of *corporate social responsibility* or *sustainable responsible business* as a new business model expressing the companies' willingness to embrace sustainable principles. These changes into business practices do not concern only corporate property. However, property is responsible for a large amount of negative externalities on the environment such as energy consumption or greenhouse gas emission. As a consequence, property sector has been specifically targeted by the recent environmental regulations aiming at reaching the objectives of the Kyoto Protocol.

Our study takes place in France where regulation concerning sustainable development has recently been reinforced. First of all, the *N.R.E.* law *(New Economic Regulations)* voted in 2001 and its article 116 make it compulsory for listed companies to write about the social and environmental impact of their activity in their annual report, in a context of corporate social responsibility. This law represents a first incentive for companies to adapt their business practices to sustainable principles. Then, a consultation process took place in France between July and December 2007 in order to define a strategy concerning ecological and sustainable issues to reach the objectives of the Kyoto Protocol. This consultation process, namely *"Grenelle de l'Environnement"*, led to a first law voted in 2009, *"Grenelle 1"*, in order to define frame and the objectives. A second law, *"Grenelle 2"* was voted in July 2010 as a national engagement

and an application paper of the *"Grenelle de l'Environnement"*. These laws have specifically targeted property sector and its impact on sustainable development using land-use and urban planning tools, or regulations on energy efficiency for buildings. This law aims at improving energy efficiency for buildings by 38% before the year 2020 and 80% before the year 2050 (Nappi-Choulet, 2010). In order to satisfy this objective, it largely relies on heat regulation in France: *RT 2000*, then *RT 2005* which is going to be replaced by *RT 2012*. The *RT 2012* aims at containing energy consumption of buildings below a level of 50 kWh (Kilo Watt per hour) per square metre per year, in comparison with a level of 105 for the *RT 2005*, for a mean consumption being 250 today.

The growing concern for sustainable buildings has also been accompanied by the emergence of rating systems aiming at certifying for sustainable performance of buildings. These rating systems are used in several works as "proxies" in order to estimate "green value" (Miller, Spivey and Florance, 2008; Fuerst and McAllister, 2009; Eichholtz, Kok and Quigley, 2010; Wiley, Benefield and Johnson, 2010). In the U.S. buildings are certified "*EnergyStar*" for energy efficiency by a joint program of the Environmental Protection Agency (EPA) and the U.S. Department of Energy. According to Wiley, Benefield and Johnson (2010) 4,100 buildings earned the EPA's *Energy Star* by the end of 2007, including 1,500 office buildings. Buildings are also certified for sustainability by the U.S. Green Building Council (USGBC): Leadership in Energy and Environmental Design, "*LEED*". The *LEED* certification aims at encouraging the adoption of sustainable building practices by promoting a whole-building approach to green design and construction including site planning, energy, water management, indoor environmental quality and material use. In the U.K. the *Breeam* label (BRE Environmental Assessment Method) certifies buildings for sustainability regarding management, health and well-being, energy, transport, water, material and waste, land use and ecology, pollution. These three rating systems have been considerably developed and are now internationally used.

Our study is conducted in France, where buildings are certified for energy efficiency regarding the *H.P.E* label (High Energy Performance) and certified for sustainability regarding the *H.Q.E* label (High Environmental Quality). These two rating systems are increasingly used for corporate property in the French context in order to reach the objectives of the *"Grenelle de l'Environnement"*. The H.P.E label has been reinforced in 2007 in order to certify buildings for energy efficiency. Five levels of certification are available, from *"High Energetic Performance"* for buildings consuming at least 10% less than the regulation level to *"Low Consumption Buildings"* for those consuming at least 50% less than the regulation level. This higher level of the *H.P.E* label has been reinforced with objectives concerning air quality to create the *"BBC-Effinergie"* label. Concerning sustainability, buildings are certified by the

H.Q.E label in France. This label relies on fourteen targets concerning the impact of the building on its external environment and its ability to create a qualitative internal environment. In order to obtain the H.Q.E label, buildings have to be rated as "very performant" for at least three targets, "performant" for at least 4 targets, "basic" for less than seven targets.

The impact of these rating systems is investigated in our survey regarding two main dimensions:

- The amount of certified buildings owned by the companies surveyed.
- The impact of sustainable buildings on territorial attractiveness by asking companies if it is able to change their location decision.

The corporate property managers are also asked if the *"Grenelle de l'Environnement"* has modified their strategies.

3.2. The main business districts in the Paris metropolitan area

This article assumes that the development of sustainable principles and its impact on companies' location choices is largely relying on the formation of business districts and their attractiveness. Data from the Immostat-IPD indicator[1] can be used to distinguish between property sub-markets in the Paris area and its adjacent suburbs (Nappi-Choulet, Maury, 2009). These sub-markets represent the formation of business districts.

The CBD or Central Business District of Paris (QCA - *"Quartier Central des Affaires"* in French): one third of the *"Ile-De-France"* office stock and almost 20% of the more than 2,000 square metres office stock is located in this area. Paris Central Business District covers the whole of the 8th district *("arrondissement"*) and parts of the 1st, 2nd, 9th, 16th and 17th Parisian districts. With a total number of 8,6 million square metres, this sector is about half of the tertiary sector surface inside Paris itself and offers to its users the most prestigious buildings in the city. The rental values are the highest on the market, at €700/square metres/year excluding tax and charges as prime levels for new properties whereas the average rent is between €564/square metre for older buildings compared with €697/square metre for new properties in 2008.

The *W.B.D* or *Western Business District* covers cities that are close to Paris and located in the *Hauts-de-Seine Department*. Multiple sub-sectors belong to this area: "*la Défense*" and "*péri-Défense*" area; the

1 Immostat is an Economic Interest Grouping that since 2001 has collated data on office transactions and office rental values supplied by its five founding real estate consultancy firms: ATISREAL Auguste Thouard, CB Richard Ellis, Insignia Bourdais, DTZ Jean Thouard and Jones Lang LaSalle.

north ring (cities of *Gennevilliers*, *Colombes* and *Asnières*) and the south ring (cities such as *Boulogne-Billancourt* or *Issy-les-Moulineaux*); and the area of *Neuilly-Levallois*. This business area grew rapidly at the end of the 80's, when about 70% of the building permits were granted. About 55% of more than 2,000 square metres offices of Parisian transactions take place in this area nowadays with rents between €300 and €600/square metres/year excluding tax and charges for the newest properties. The north and south rings represent 17% of the rental value transactions of more than 2,000 square metres offices in 2008, whereas *"La Défense"* area represents 31% of the placed demand in 2008.

La Défense is a major business center in Europe with 3 million square metres of tertiary surface, hosting more than 2,500 companies, 1,500 head offices and 180,000 employees. Started in 1958 and joining up the three cities of *Puteaux*, *Courbevoie* and *Nanterre*, *la Défense* business district was mostly developed between 1985 and 1992, then with a second phase since 2000. This market represents about 9 to 10% of the rental demand in *Ile-de-France* depending on the year. The rents are among the most expensive for the Parisian region, behind those of Paris CBD, but nevertheless with an average in 2008 of €400 and €500/square metres/year excluding tax and charges for new offices depending on the area (*Défense* or *péri-Défense*) and €256 and €400/square metres/year excluding tax and charges for second-hand rents.

The first adjacent suburbs of Paris are located in the area covering the 27 cities bordering Paris on the North East side. It represents about 10 to 15% of the office market. The new Saint-Denis business district belongs to this Immostat-IPD indicator area. It represents 15% of the rental demand for offices of more than 2,000 square metres of the "first ring" in 2008.

This article assume that sustainability issues are able to influence attractiveness for business districts and thus to influence location strategies of the companies. This background knowledge on the location of business districts allows us to set up a typology of three locations for the companies surveyed:

- Zone1: *Paris and Western Business District*
- Zone 2 : *Ile-De-France without Paris and Western Business District*
- Zone 3 : *other locations (outside Ile-De-France)*

4. Methodology and Profile of companies surveyed

The aim of our study is to examine how sustainability becomes imperative for corporate property decisions, particularly for office buildings. This paper assumes that sustainability influences attractiveness for business districts through corporate property strategies and location choices. In order to test this hypothesis, we use a behavioural survey based on a questionnaire conducted in October 2010 across a

large sample of corporate property managers and focusing on the impact of sustainability on office property strategies. The survey was conducted thanks to the *Agora des Directeurs Immobiliers – ADIMM* and the *Association des Directeurs Immobiliers* which are participative networks of French corporate property managers. It allows us to have an original view of the improvement of sustainable principles on these actors' behaviour. The survey was administered thanks to software which sends questionnaires by email and collects the responses. Exploiting the results of the survey allows us to produce our own database in order to represent corporate property managers' view on sustainability issues. We used a Multiple Correspondence Analysis (MCA) to interpret the results because of the qualitative nature of the survey variables. A similar method is used by Nappi-Choulet (2006) to analyze the involvement of private investors and developers in urban regeneration initiatives. In this paper, we adapt this method to emphasize the improvement of sustainability issues into corporate property strategies. The issue of sustainability is surveyed regarding the adaptation to environmental regulations and its consequences on property strategies, the perception that property managers have of a "sustainable city" and the influence of sustainable factors on their location decision relatively to traditional urban factors (rental cost, accessibility, proximity between firms and services…). Sustainability is also investigated through its social dimension regarding management practices such as "space planning" and its impact on employees' well-being and productivity. The results of the survey are presented in the next section and confirm a general improvement of sustainable principles on the behaviour of corporate property managers.

The study was carried out among 236 property managers of companies that are listed or not listed on the stock exchange and whose real-estate assets management does not constitute their core business activity. The rate of response of the study is 25.5 %, which represents 60 companies. Sampling procedure were applied to ensure a sufficient number of observations and to remove duplicates. We obtain a sample of 52 companies which is statistically significant and for whom all the survey questions are completed. Table 1 (Appendix 1) provides a general view of the companies surveyed: 52 % of them are listed on the stock exchange (CAC40 / Euronext, SBF120, NASDAQ, etc.), 42 % belong to the industrial sector (25 % in the manufacturing industry), the remaining 58 % belong to the tertiary sector (20 % in the sectors of finance, real-estate and insurance). Almost 45 % of businesses in our sample manage property amounting to over 500,000 square metres, of which 13 % are enormous areas of over 4 million square metres. Most of the companies' headquarters (61 %) are located into the main Paris business districts (*Zone 1*). Finally, the annual operating revenue of companies sampled varies from 5 million to 80 billion Euros with an average of 9 billion and the number of employees varies from 24 to 303,041 with an average of 44,530.

The survey questionnaire, comprising 45 questions, is divided into three parts.

The first part seeks background information about the company and the development of the corporate property function. Our sample is essentially composed of businesses for which the property component is clearly identified. In almost 50 % of the cases, that component is now established within companies for over ten years; it is less than five years old for 20 % of the respondents. Departments that manage a company's property in use are generally small - fewer than ten people for almost two-thirds of companies. Conversely, out of the 17 % companies surveyed, of which 80 % are tertiary companies from the finance and insurance sectors, the size of the department is over 50 people. Unlike what one might expect in times of crisis or in a context of real-estate outsourcing which characterized the decade starting in 2000, the size of property departments within companies has grown significantly in the past three years for one third of the companies (especially those in the CAC40).

The second part of the survey concerns the amount of property managed in all kinds of assets and specifically in office buildings, and the property management practices. As mentioned above, almost 45 % of companies in our sample manage property amounting to over 500,000 square metres in all kinds of operating assets, 18 % if we consider only office buildings. The share of total surface area of office buildings held as property varies from 0% (the business is just a tenant) to 100 %, the average being 38% and the median is 30 % for our entire sample. Only 10 % of companies are 100 % owners of their total number of offices. However that rate differs according to whether or not companies are listed on the stock exchange: listed companies on average have fewer buildings (34 % of the surface area of their office property in France) than companies that are not listed (43 %). That same distinction is found with respect of ownership of head offices (44 % for listed companies, 58 % for those not listed). The overall surface area for the sampled companies' head offices represents 1,396,100 square metres. Half of the real-estate executives covered in the survey manage 35 buildings in France, that is, the equivalent of 48 leases.

The third and last part of the survey focuses on sustainability issues in order to investigate the changes in management practices, the adaptation to new environmental regulations, the perception of a "sustainable city" and its influence on territorial attractiveness. This part of the questionnaire is of fundamental interest for this research. Table 2 (Appendix 1) provides some details about sustainable practices regarding the type of company surveyed. Almost one third (31 %) of companies are owners or tenants of one or several *H.Q.E.* buildings (of which 75 % are listed companies, 69 % belong to the service sector and 67 % have more than 10,000 employees). Only 11 % of the companies have a certified head office (of which 67 % are listed companies, 83 % are tenant, 67 % belong to the service sector and have more than 10,000 employees). Finally, 70% of the companies have created a specific department for sustainable development (of which 64 % are listed companies and 62 % have more than 10,000 employees). The

main results concerning sustainability issues and their influence on territorial attractiveness are presented in the next section.

Because of the qualitative nature of the survey variables, a Multiple Correspondence Analysis (MCA) approach was undertaken to examine key factors reflecting the improvement of sustainability on the behavior of property managers. This method allows us to draw up a typology of actors regarding their companies' characteristics and the way they value sustainability. This inductive approach is a generalization of Correspondence Analysis for categorical variables. It makes it possible to map the associations between several categorical variables from the survey and to identify stable patterns in the data. The theory of correspondence analysis is explained in detail in several publications (e.g. Benzecri 1973; Greenacre 1984, 1993; Saporta, 1990) and often used in marketing literature. This descriptive statistical technique, while particularly useful for analysing large numbers of observations, is nevertheless well-suited to smaller-sized samples, provided that the number of active variables included in the analysis does not exceed the number of individuals in the sample.

Eigenvalues are vitally important in interpretation to assess the general form of the cloud and indicate which axis matter. They are used to determine the amount of explained variance. The first four eigenvalues of the analysis are respectively 0.174, 0.132, 0.106 and 0.095. However, these proportions often provide a pessimistic indication of fit and are uninterpretable. We therefore used the inertia adjustment proposed by Benzecri (1979), which produces a better indication of which axes matter and should be used for the analysis. This adjustment does not affect the contributions, which are still calculated in relation to the original eigenvalues. The adjusted eigenvalues are respectively 0.017, 0.007, 0.003 and 0.002. The corrected percentages of inertia for the first four dimensions are respectively 52.1 %, 22.89 %, 10.57 % and 6.85 % (see Table 3 in Appendix 2). They give an accurate expression of the relative importance of the factors. The cumulated inertia of those four factors is thus 92.4%; therefore, we decided to keep only the first four axes for our analysis. The ACM analysis was performed on 20 relevant variables as listed in Table 3 (Appendix 2).

Because of the qualitative aspect of the variables and the small size of the survey sample, non-parametric tests were used to sharpen the interpretation of the MCA results: the Chi-squared test was conducted between the main categorical variables emphasized by the MCA and the variables concerning sustainable development. Tables 4, 5, 6 and 7 present the results of these independent tests.

5. Results and discussion of the empirical findings

5.1. Towards a typology of property manager regarding sustainability

To interpret an MCA, the absolute contributions and squared correlations are calculated for each axis (Greenacre, 1984). Table 3 (Appendix 2) presents the basic numerical results of the MCA analysis for the first four dimensions (i.e. factors). The contributions are coefficients of determination giving the explained variance of each variable by each dimension or factor. Figures 1, 2 and 3 show the MCA maps created by combining the first four axes of inertia, representing the cloud of modalities.

The first two-dimensional map alone (Figure 1) explains 75% of the total inertia of the 20 active variables. To interpret the graph, the positions, relative to an axis, of the points belonging to a given cloud are examined. If two such points are close on the graph, they will have a similar profile. Graphically, the further a point is from the origin, the smaller its marginal weight, and the bigger its contribution to inertia. Similarly, the smaller the angle between a point and an axis, the closer to 1 is its squared correlation (cosine^2) on this axis.

From Figure 1, a homogeneous form can be observed for the cloud of modalities in plane 1-2. No quadrant of this plane is empty, and many modalities are also positioned at the extremity of the axis, indicating that several of the survey questions have contributed to discriminate the sample population. This gives an interesting view of the valuation of sustainable issues by the different actors.

Figure 1. MCA results, plan 1-2.

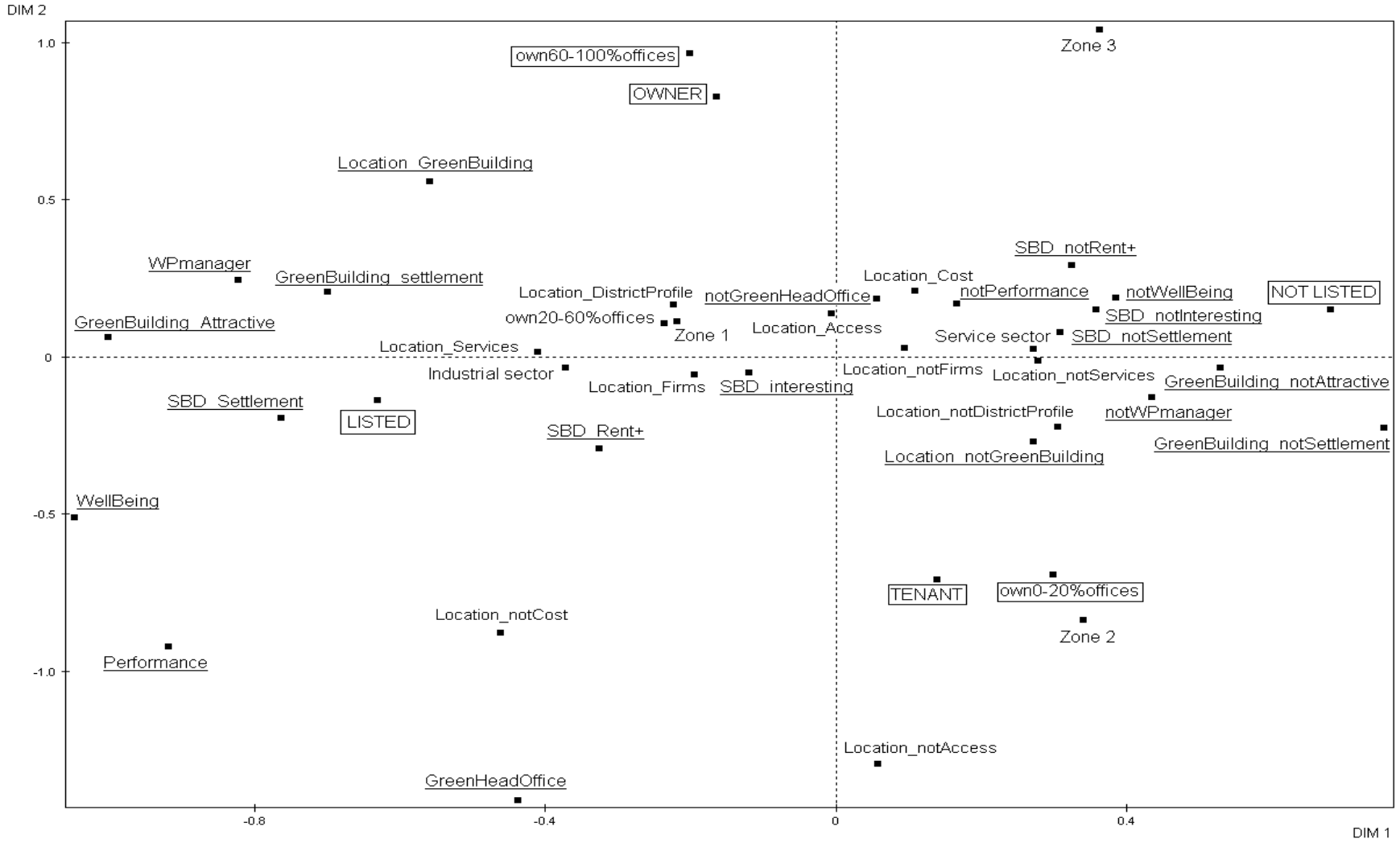


Figure 2. MCA results, plan 1-3.

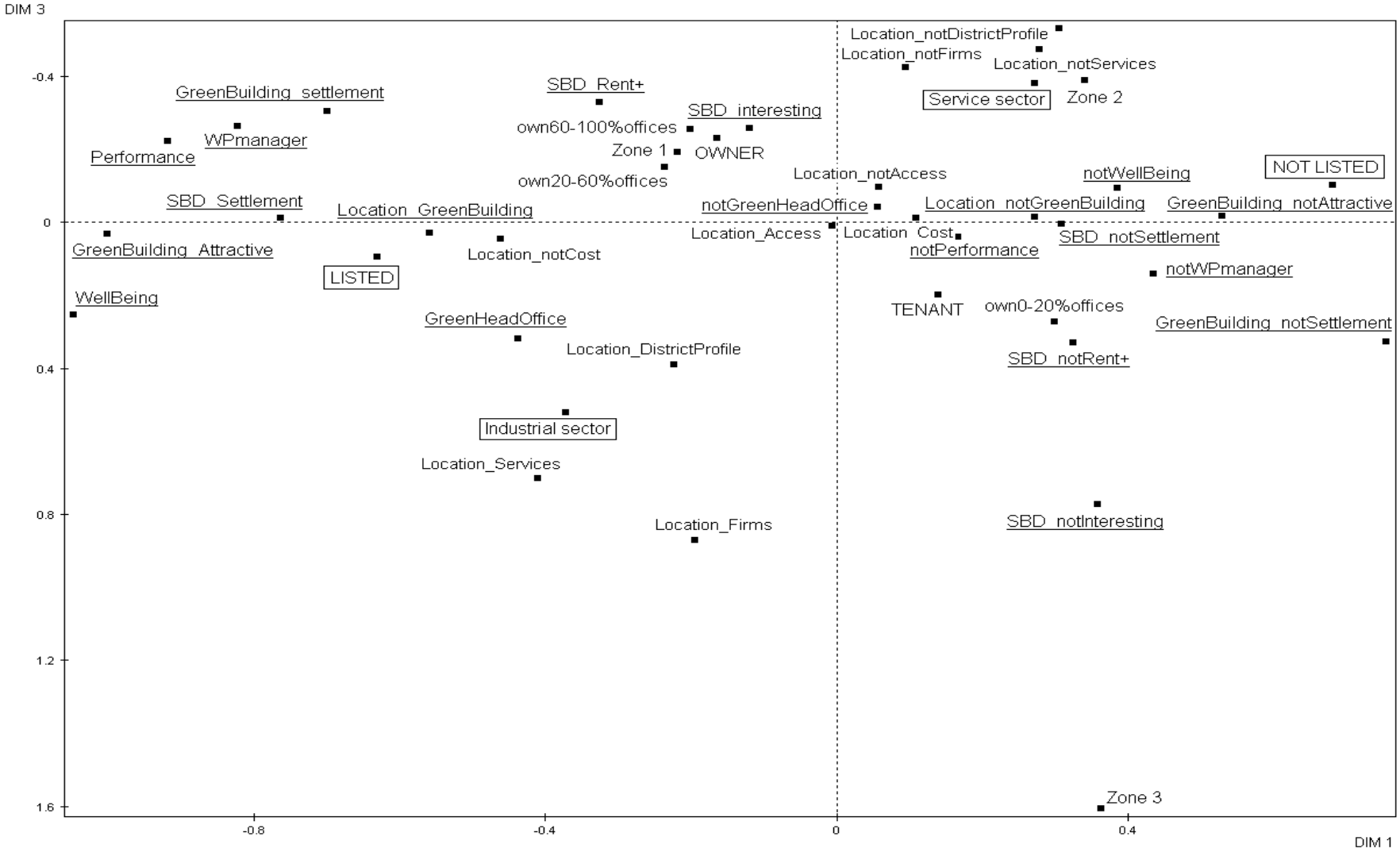
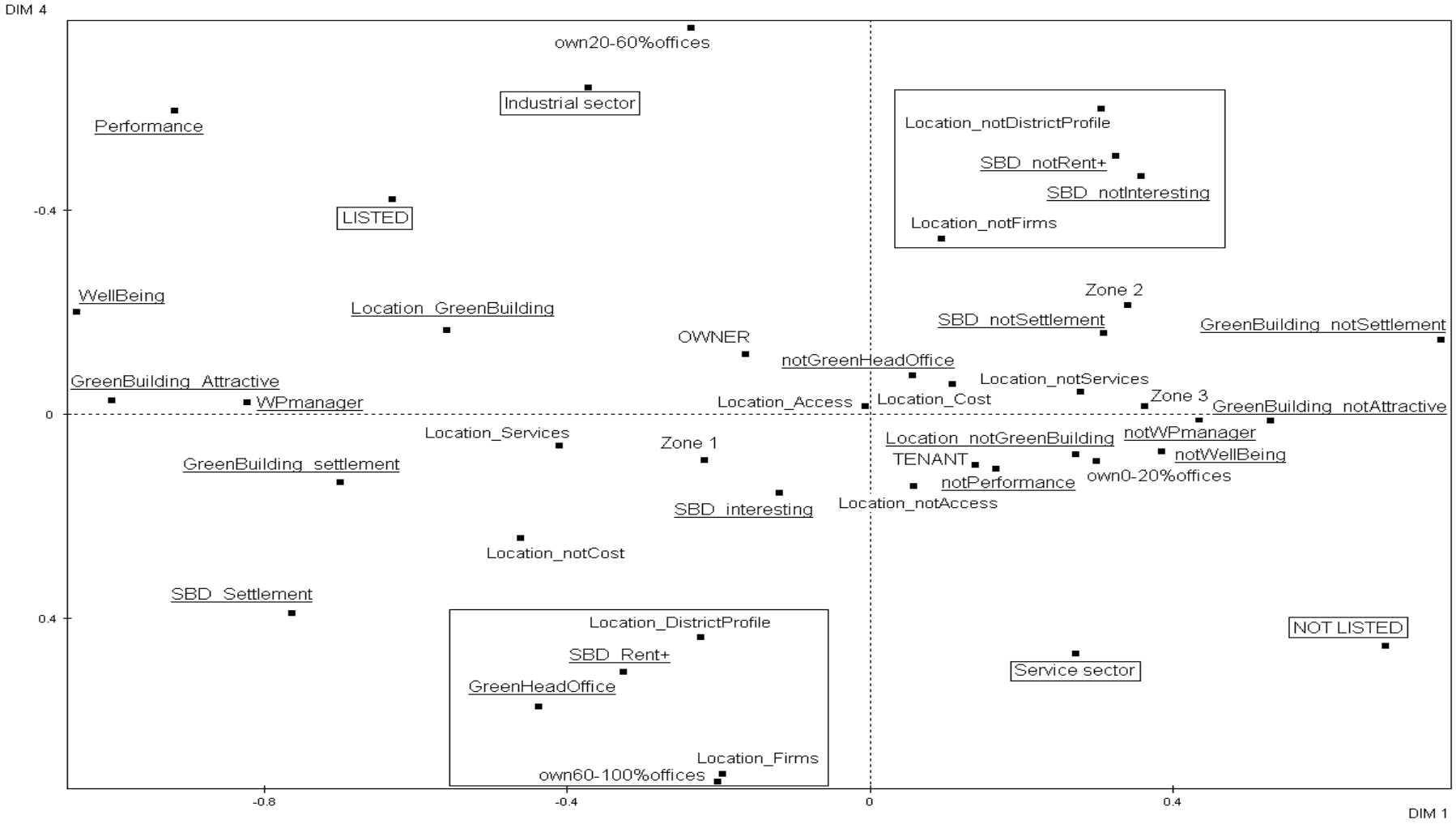


Figure 3. MCA results, plan 1-4.



Using Table 3 to identify the important points in the map, we see that the first factor is a dimension which groups together the following factors, in order of explained variance: influence of *green buildings* for *location choice (settlement)* and *territorial attractiveness*, companies *listed* or *not listed* on the stock exchange, *space planning* and its impact on employees' *well-being*. These features represent almost 65 % of the variance explained by the first dimension. Using Figure 1, we observe on the left part of the first axis that being a listed company is strongly associated with taking into account green building certification when choosing a location or estimating territorial attractiveness. It is also strongly associated with the use of space planning and its impact on employees' well being. Whereas on the right part of the first axis, the companies that are not listed on the stock exchange are associated with a weak consideration for these sustainable principles.

The second dimension appears to be explained mainly by the following factors: being *owner* or *tenant* of the head office, the amount of *office buildings owned in property*, and *location of the head office*. This second axis distinguishes companies which own their head office and a large amount of their office building, located mainly in Zone 1 (Paris and Western Business District) or *Zone 3 (outside Ile-De-France)* on one hand; and companies which are tenant of their head office and own a small part of their office buildings, located mainly in *Zone 2 (Ile-De-France without Paris and Western Business District)* on the other hand. Using Figure 1, we observe that the first group of "*owners*" are close to the left part of the first axis which represents a strong consideration for sustainable principles, whereas the second group of "*tenants*" are close to the right part of the first axis which represent a weak consideration for sustainable principles.

The third dimension is explained mainly by the following factors (Figure 2): *industrial or service sector*, traditional determinants for location choice (*proximity between firms, services, district profile*) and *location of the head office*. This axis groups together companies from the industrial sector with considerations for proximity with other firms, services and district profile when choosing a location. On the opposite part of this third axis, companies from the service sector mainly located in Zone 2 are associated with low consideration for these determinants of location.

Lastly, the fourth dimension groups variables such as interest for *SBD (Sustainable Business Districts)*, traditional determinants for *location choice* and the amount of *office building owned in property*. We also observe a distinction between *industrial and service sector* (as in axis 3). However, using Figure 3 we observe that this dimension emphasizes two main groups:

- Companies which own a large amount of office buildings and a green head office. These companies consider that a *SBD* justifies a rent premium and are influenced by proximity between firms and by district profile when choosing their location.
- Companies which are neither interesting in *SBD* (does not justify a rent premium), proximity between firms nor in district profile when choosing their location.

Through the use of MCA, we can develop testable hypotheses about reliable associations between types of actors and the dimensions of sustainability they take into consideration in their decision-making. The results of the MCA show that the valuation of sustainable development is strongly associated with the following variables:

- Companies that are listed or not listed on the stock exchange.
- Companies that are owner or tenant of their head office, and the amount of office buildings owned in property.
- Location of the head office and companies belonging to industrial or service sector.

These three main results are analysed in the following sub-sections. The use of non-parametric tests allows us to sharpen the interpretation of the valuation of sustainability issues by the different groups of actors.

5.2. The importance of sustainability for location strategies and attractiveness for business districts

The MCA results allow us to identify the main characteristics of companies regarding the way they value sustainability issues. The influence of sustainable development on property management practices and territorial attractiveness highlights key elements to differentiate the type of actors.

The first important result emphasized by the MCA approach is the association between listed companies and the dimensions of sustainable development. This interaction is represented through the first axis of the MCA which explains 52 % of the variance. Using Figure 1, we observe that listed companies seem to value green buildings and the existence of a *SBD (Sustainable Business District)* as an indicator of territorial attractiveness. They are also associated with management practices such as space planning and the evaluation of its impact on employees' well-being and performance. This result is confirmed by a non-parametric Chi-square test conducted to estimate relationship between the variable "Listed or Not listed" and the variables representing dimensions of sustainable development. Table 4 present the variables which are statistically significant according to the Chi-square test which means they cannot be considered as independent from the variable *"Listed or Not listed"*.

Table 4. Chi-square test for independence between variable *"Listed or Not listed"* and dimensions of sustainable development.

Significant variables	Chi-squared test
Green buildings influences settlement	4.89**
Green buildings for territorial attractiveness	10.88***
SBD influences settlement	3.871**
Impact of WP on wellbeing	8.763**
Impact of WP on Performance	4.794**

**significant at the 10 per cent level*
***significant at the 5 per cent level*
****significant at the 1 per cent level*

This strong improvement of these dimensions of sustainable development expressed by listed companies can be interpreted by reference to an increasing regulation constraint. As mentioned earlier (cf. Part 3), the New Economics Regulations voted in 2001 in France makes it compulsory for listed companies to have a specific department dedicated to sustainable development and to mention the social and environmental impact of their activity in their annual report, in order to communicate about their societal responsibility. However, this result demonstrates a strong improvement of sustainability issues for listed companies, which is able to moderate the opposition found in the literature between sustainable development and the speculative behaviour of private actors listed on the stock exchange, in a context of globalisation of the property market (Boisnier, 2010; Theurillat, 2010). Keeping in mind the potential conflicts existing between the stock exchange and the paradigm of sustainability, this result highlights a diffusion of sustainable principles to these listed private actors and an influence on their location strategies.

The second results emphasized by this study deals with ownership of the head office and of the office buildings managed in property. This type of actors is differentiated regarding the interest for green buildings when choosing their location. The ownership of the head office seems to be the major variable distinguishing the actors regarding this dimension, even if the amount of office building owned in property appears to follow the same tendency. For the interpretation of this dimension we thus refer to a group of *"owner"* representing companies which own their head office and generally a large amount of their office building; and to a group of *"tenant"* representing companies which are tenant of their head office and of a large amount of their office buildings. All along Figures 1, 2 and 3, we observe that the *"owner"* group is always associated with green buildings for their location choice, whereas the *"tenant"* group seems to be more sensitive to the cost when choosing their location. This result is confirmed in

Table 5 by conducting a Chi-square test between the variable *"Owner or tenant of the head office"* and the variables representing questions about sustainable development. We find a statistically significant relationship between this variable and the variables representing green buildings and cost as determinants for location. This group of actors is thus clearly differentiated by the determinant of their location choice between green buildings and cost.

Table 5. Chi-square test for independence between variable *"Owner or Tenant"* and dimensions of sustainable development.

Significant variables	Chi-squared test
Cost determinant for location choice	6.512**
Green buildings determinant for location choice	3.498*

**significant at the 10 per cent level*
***significant at the 5 per cent level*
****significant at the 1 per cent level*

This result can be interpreted by reference to the concept of "green value". As mentioned earlier (cf. Part 2), a growing number of academic researches found that green buildings on average allow for higher rental premiums, higher occupancy rates and thus higher asset values (Miller, Spivey and Florance, 2008; Fuerst and McAllister, 2009; Eichholtz, Kok and Quigley, 2010; Sayce, Sundberg, Clements, 2010; Wiley, Benefield and Johnson, 2010). As Miller, Pogue, Saville and Tu (2010) pointed out, "rental premiums and higher occupancy rates should lead to higher values generally by more than the extra costs to go green". This result is confirmed by our study revealing the interest of the group of *"owner"* for green buildings when choosing their location whereas the group of *"tenant"* is more sensitive to the cost. Green buildings may imply higher values for owners, whereas the rent premiums may imply extra cost for tenant, even if it may imply less operating expenses. Our results show that if owners have fully integrated the potential value of green buildings in their decision-making, tenants are still more sensitive to the extra-cost even with a potential decrease of operating expenses in a long-term perspective.

Finally, the third main result of the MCA approach emphasizes the role of activity sector (*industrial vs. service sector*) and location of the head office on the interest for sustainability issues. From Figure 1, 2 and 3, we observe that industrial sector is often associated with sustainability concerns in addition to more traditional determinants for location such as proximity with other firms, services or districts profile whereas service sector is associated with a weak consideration for these dimensions. The Chi-square test

conducted between activity sector and the variables representing sustainability issues confirms this result as shown in Table 6.

Table 6. Chi-square test for independence between variable *"Industrial or Service sector"* and dimensions of sustainable development.

Significant variables	Chi-squared test
SBD justifies rent premium	2.836*
Services determinant for location choice	3.176*
Green buildings determinant for location choice	2.823*
Impact of WP on wellbeing	3.791*

**significant at the 10 per cent level*
***significant at the 5 per cent level*
****significant at the 1 per cent level*

If service sector seems to consider that a *SBD* justifies a rent premium, companies from the industrial sector are strongly sensitive to green buildings when choosing their location and measure the impact of space planning on their employees' well-being. Industrial sector is also strongly sensitive to proximity with services among traditional determinants for location.

More interesting is the fact that companies whose head office is located in Paris business districts are more sensitive to sustainability issues. All along Figure 1, 2 and 3, we observe that the variable "Zone1: Paris and Western Business District" is strongly associated with the left part of the first axis which represents interest for sustainability issues. The Chi-Square test conducted between the variable *"Location of the Head Office"* and the variables representing sustainability issues allow us to confirm this result (Table 7).

Table 7. Chi-square test for independence between variable *"Location of the Head Office"* and dimensions of sustainable development.

Significant variables	Chi-squared test
SBD is interesting	9.355**
Firms determinant for location choice	6.573**
District profile determinant for location choice	6.416**

**significant at the 10 per cent level*
***significant at the 5 per cent level*
****significant at the 1 per cent level*

This test shows that companies whose head office is located in Paris business districts are strongly sensitive to the existence of a *SBD*, in addition to traditional determinants for business districts such as proximity between firms and district profile. This result supports our hypothesis underlining the importance of sustainable dimensions for the attractiveness of business centres. It emphasizes the role played by urban centralities on the achievement of a sustainable city.

6. Conclusion

The objective of this paper is to investigate how sustainability influences corporate property strategies and attractiveness for business districts. We use a behavioural survey conducted across a large sample of corporate property managers which allows us to highlight the view of office buildings' users on the impact of sustainability issues. The role of sustainability on location choice is surveyed regarding traditional determinants of attractiveness for business districts such as cost, interactions with other firms, proximity with services and accessibility. The survey emphasizes a general improvement of sustainable principles on the behaviour of corporate property managers. The use of a MCA approach sharpens this result by identifying key factors explaining how sustainability influences corporate property decisions and by drawing up a typology of actors regarding the way they integrate sustainable principles to their location choices. This approach allows us to highlight three main results.

- The first result shows that sustainability strongly affects location strategies of listed companies which confirm the diffusion of sustainable principles to private listed actors in a context of globalization of the property market.
- The second result emphasizes the strong association between ownership of the head office and the sensibility to sustainable principles for location choices. This result can be interpreted by reference to the notion of "green value". If landlords and owners have fully integrated the potential value of green buildings, in their decision making, tenants are still to the extra cost of going green.
- Finally, the third result emphasized by the MCA shows that the influence of sustainability on location choice strongly concerns companies whose head office is located in one of the main business districts of the Paris metropolitan area. This result confirms the influence of sustainability on attractiveness for business districts and the importance of urban centralities to support the achievement of a sustainable city.

This approach highlights the interest of a territorial approach to study the impact of sustainable principles on corporate property.

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Appendix 1. Companies surveyed

Table 1. List of companies surveyed and descriptive statistics, 2009.

Firms	Stock exchange	Sector	Operating Revenue (million €)	Head Office (square metres)	Head Office Location
TIME WARNER (France)	not listed	Service Sector	341	9,000	Zone 1
GDF SUEZ	listed	Industrial Sector	79,908	80,000	Zone 1
GROUPE RAPP	not listed	Industrial Sector	675	11,000	Zone 3
BNP PARIBAS	listed	Service Sector	40,584	20,000	Zone 1
IPSEN	listed	Industrial Sector	1,112	12,000	Zone 2
APICIL	not listed	Service Sector	799	12,000	Zone 3
ESSILOR International	listed	Industrial Sector	3,270	6,500	Zone 2
ALSTOM GRID	listed	Industrial Sector	5	10,000	Zone 1
NEXTER SYSTEMS	not listed	Service Sector	726	7,000	Zone 2
NXP SemiConduteur	listed	Service Sector	209	50,000	Zone 3
EADS DEFENCE & SECURITY	listed	Service Sector	221	80,000	Zone 2
SOFINCO / GROUPE CA	not listed	Service Sector	2,426	20,000	Zone 1
SANOFI AVENTIS	listed	Industrial Sector	31,615	18,000	Zone 1
REGUS	not listed	Service Sector	61	20,000	Zone 1
PRICEWATERHOUSECOOPERS	not listed	Service Sector	354	30,000	Zone 1
SNCF	not listed	Service Sector	25,418	20,000	Zone 1
LOGICA	listed	Service Sector	749	21,000	Zone 1
AREVA	listed	Industrial Sector	9,015	28,000	Zone 1
COVIDIEN	listed	Industrial Sector	219	15,000	Zone 2
FRAIKIN	not listed	Service Sector	611	3,900	Zone 1
MICROSOFT (France)	listed	Service Sector	380	34,000	Zone 2
GROUPE EDF	listed	Industrial Sector	69,494	22,000	Zone 1
SCHLUMBERGER	not listed	Service Sector	251	5,000	Zone 1
PHILIPS FRANCE	listed	Industrial Sector	2,282	24,000	Zone 1
AEROPORTS DE PARIS	listed	Service Sector	2,641	7,000	Zone 1
EADS	listed	Industrial Sector	495	36,000	Zone 1
GROUPE BAYARD	not listed	Service Sector	219	16,000	Zone 2
MICHELIN	listed	Industrial Sector	14,807	15,000	Zone 3
BRED - BANQUE POPULAIRE	not listed	Service Sector	1,764	30,000	Zone 1
BRICOMAN - GOUPE ADEO	not listed	Industrial Sector	351	2,500	Zone 3
MULTIBURO	not listed	Service Sector	20	0	Zone 3
THALES	listed	Industrial Sector	12,882	17,000	Zone 1
LVMH	listed	Industrial Sector	17,053	16,000	Zone 1
ISS FRANCE	not listed	Service Sector	573	10,000	Zone 2
HERMES	listed	Industrial Sector	1,917	5,500	Zone 1
DHL	listed	Service Sector	255	12,000	Zone 2
REUNICA	not listed	Service Sector	337	10,000	Zone 1
GROUPE LA POSTE	not listed	Service Sector	19,558	30,000	Zone 1
SOCIETE GENERALE	listed	Service Sector	22,450	200,000	Zone 1
SNCF	not listed	Service Sector	25,418	18,000	Zone 1
SAFRAN	listed	Industrial Sector	10,715	11,000	Zone 1
TDF SAS	not listed	Service Sector	979	8,000	Zone 2
ENDEL INEO	not listed	Service Sector	534	3,000	Zone 2
LCL - LE CREDIT LYONNAIS	listed	Service Sector	3,839	70,000	Zone 1
RATP DEPARTEMENT DU PATRIMOINE	not listed	Service Sector	6	90,000	Zone 1
GROUPE INDUSTRIEL MARCEL DASSAULT	listed	Industrial Sector	5,288	3,000	Zone 1
BPCE	not listed	Service Sector	19,392	40,000	Zone 1
SONEPAR	not listed	Industrial Sector	262	12,000	Zone 2
AMERICAN EXPRESS GROUP (France)	not listed	Service Sector	151	20,000	Zone 1
MONOPRIX	not listed	Industrial Sector	3,735	18,000	Zone 2
PLASTIC OMNIUM	listed	Industrial Sector	2,477	13,000	Zone 3
ALSTOM	listed	Industrial Sector	19,651	13,000	Zone 1

Table 2. Sustainable practices of companies surveyed.

	Are you owner or tenant of one or several HQE buildings?			Is your head office certified?			Is there a specific department for sustainable development?		
	Yes	No	Total	Yes	No	Total	Yes	No	Total
Stock exchange									
listed	44.4%	55.6%	100.0%	14.8%	85.2%	100.0%	85.2%	14.8%	100.0%
	75.0%	41.7%	51.9%	66.7%	50.0%	51.9%	63.9%	25.0%	51.9%
not listed	16.0%	84.0%	100.0%	8.0%	92.0%	100.0%	52.0%	48.0%	100.0%
	25.0%	58.3%	48.1%	33.3%	50.0%	48.1%	36.1%	75.0%	48.1%
Total	30.8%	69.2%	100.0%	11.5%	88.5%	100.0%	69.2%	30.8%	100.0%
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Property owned (square metres)									
<100.000	20.0%	80.0%	100.0%	20.0%	80.0%	100.0%	26.7%	73.3%	100.0%
	18.8%	33.3%	28.8%	50.0%	26.1%	28.8%	11.1%	68.8%	28.8%
100 to 500.000	28.6%	71.4%	100.0%	7.1%	92.9%	100.0%	71.4%	28.6%	100.0%
	25.0%	27.8%	26.9%	16.7%	28.3%	26.9%	27.8%	25.0%	26.9%
500.000 to 2 million	46.7%	53.3%	100.0%	13.3%	86.7%	100.0%	93.3%	6.7%	100.0%
	43.8%	22.2%	28.8%	33.3%	28.3%	28.8%	38.9%	6.3%	28.8%
> 2 million	25.0%	75.0%	100.0%	0.0%	100.0%	100.0%	100.0%	0.0%	100.0%
	12.5%	16.7%	15.4%	0.0%	17.4%	15.4%	22.2%	0.0%	15.4%
Total	30.8%	69.2%	100.0%	11.5%	88.5%	100.0%	69.2%	30.8%	100.0%
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Head Office									
tenant	32.1%	67.9%	100.0%	17.9%	82.1%	100.0%	67.9%	32.1%	100.0%
	56.3%	52.8%	53.8%	83.3%	50.0%	53.8%	52.8%	56.3%	53.8%
owner	29.2%	70.8%	100.0%	4.2%	95.8%	100.0%	70.8%	29.2%	100.0%
	43.8%	47.2%	46.2%	16.7%	50.0%	46.2%	47.2%	43.8%	46.2%
Total	30.8%	69.2%	100.0%	11.5%	88.5%	100.0%	69.2%	30.8%	100.0%
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Sector									
Industrial Sector	22.7%	77.3%	100.0%	9.1%	90.9%	100.0%	77.3%	22.7%	100.0%
	31.3%	47.2%	42.3%	33.3%	43.5%	42.3%	47.2%	31.3%	42.3%
Service Sector	36.7%	63.3%	100.0%	13.3%	86.7%	100.0%	63.3%	36.7%	100.0%
	68.8%	52.8%	57.7%	66.7%	56.5%	57.7%	52.8%	68.8%	57.7%
Total	30.8%	69.2%	100.0%	11.5%	88.5%	100.0%	69.2%	30.8%	100.0%
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Operating Revenue (million €)									
<500	16.7%	83.3%	100.0%	5.6%	94.4%	100.0%	44.4%	55.6%	100.0%
	18.8%	41.7%	34.6%	16.7%	37.0%	34.6%	22.2%	62.5%	34.6%
500 to 5.000	33.3%	66.7%	100.0%	11.1%	88.9%	100.0%	72.2%	27.8%	100.0%
	37.5%	33.3%	34.6%	33.3%	34.8%	34.6%	36.1%	31.3%	34.6%
>5.000	43.8%	56.3%	100.0%	18.8%	81.3%	100.0%	93.8%	6.3%	100.0%
	43.8%	25.0%	30.8%	50.0%	28.3%	30.8%	41.7%	6.3%	30.8%
Total	30.8%	69.2%	100.0%	11.5%	88.5%	100.0%	69.2%	30.8%	100.0%
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Employees									
<1.000	8.3%	91.7%	100.0%	0.0%	100.0%	100.0%	41.7%	58.3%	100.0%
	6.7%	32.4%	24.5%	0.0%	27.9%	24.5%	14.7%	46.7%	24.5%
1000 to 10.000	25.0%	75.0%	100.0%	12.5%	87.5%	100.0%	50.0%	50.0%	100.0%
	26.7%	35.3%	32.7%	33.3%	32.6%	32.7%	23.5%	53.3%	32.7%
>10.000	47.6%	52.4%	100.0%	19.0%	81.0%	100.0%	100.0%	0.0%	100.0%
	66.7%	32.4%	42.9%	66.7%	39.5%	42.9%	61.8%	0.0%	42.9%
Total	30.6%	69.4%	100.0%	12.2%	87.8%	100.0%	69.4%	30.6%	100.0%
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Appendix 2. The formation of the MCA axis

Table 3. Eigenvalues. contributions and square correlations for the MCA

	Dimensions			
	1	2	3	4
Eigenvalue	0.174	0.132	0.106	0.095
Percentage of inertia	15.85	12.04	9.64	8.64
Adjusted eigenvalue	0.017	0.007	0.003	0.002
Corrected percentage of inertia	52.1	22.89	10.57	6.85

	Contributions	Cosine²	Contributions	Cosine²	Contributions	Cosine²	Contributions	Cosine²
Stock Exchange								
listed	5.927	0.430	0.378	0.021	0.215	0.010	4.812	0.190
not listed	6.401	0.430	0.408	0.021	0.233	0.010	5.197	0.190
TOTAL	12.329		0.786		0.448		10.010	
Head Office								
owner	0.354	0.023	11.940	0.587	1.161	0.046	0.330	0.012
tenant	0.304	0.023	10.234	0.587	0.995	0.046	0.283	0.012
TOTAL	0.658		22.174		2.156		0.613	
Property owned								
own0-20%offices	1.086	0.066	7.647	0.351	1.486	0.055	0.191	0.006
own20-60%offices	0.491	0.025	0.130	0.005	0.332	0.010	9.254	0.254
own60-100%offices	0.311	0.015	9.495	0.344	0.832	0.024	7.313	0.190
TOTAL	1.888		17.271		2.650		16.758	
Head Office certified								
GreenHeadOffice	0.633	0.025	8.701	0.260	0.556	0.013	1.991	0.043
notGreenHeadOffice	0.083	0.025	1.135	0.260	0.072	0.013	0.260	0.043
TOTAL	0.716		9.836		0.628		2.251	
Green buildings influences settlement								
GreenBuilding_notSet	7.878	0.529	0.916	0.047	2.437	0.099	0.529	0.019
GreenBuilding_settle	7.295	0.529	0.848	0.047	2.256	0.099	0.490	0.019
TOTAL	15.173		1.764		4.693		1.018	
Green buildings for territorial attractiveness								
GreenBuilding_Attrac	9.952	0.531	0.053	0.002	0.016	0.001	0.013	0.000
GreenBuilding_notAtt	5.269	0.531	0.028	0.002	0.008	0.001	0.007	0.000
TOTAL	15.220		0.080		0.024		0.020	
SBD influences settlement								
SBD_notSettlement	1.958	0.237	0.165	0.015	0.001	0.000	0.939	0.062
SBD_Settlement	4.831	0.237	0.408	0.015	0.002	0.000	2.317	0.062
TOTAL	6.789		0.573		0.002		3.257	
SBD justifies rent premium								
SBD_notRent+	1.523	0.106	1.616	0.086	2.556	0.108	6.722	0.256
SBD_Rent+	1.523	0.106	1.616	0.086	2.556	0.108	6.722	0.256
TOTAL	3.045		3.231		5.112		13.444	
SBD is interesting								
SBD_interesting	0.306	0.043	0.071	0.008	2.342	0.199	0.950	0.072
SBD_notInteresting	0.919	0.043	0.213	0.008	7.025	0.199	2.850	0.072
TOTAL	1.225		0.284		9.366		3.800	
Accessibility determinant for location choice								
Location_Access	0.001	0.000	0.649	0.179	0.005	0.001	0.011	0.002
Location_notAccess	0.009	0.000	6.099	0.179	0.043	0.001	0.102	0.002
TOTAL	0.010		6.748		0.048		0.112	
Cost determinant for location								

choice								
Location_Cost	0.279	0.051	1.337	0.184	0.005	0.001	0.143	0.014
Location_notCost	1.171	0.051	5.617	0.184	0.020	0.001	0.600	0.014
TOTAL	1.449		6.955		0.025		0.742	
Services determinant for location choice								
Location_notServices	1.321	0.114	0.003	0.000	6.326	0.332	0.057	0.003
Location_Services	1.950	0.114	0.004	0.000	9.338	0.332	0.085	0.003
TOTAL	3.271		0.007		15.663		0.142	
Firms determinant for location choice								
Location_Firms	0.353	0.018	0.040	0.002	11.732	0.370	8.520	0.241
Location_notFirms	0.172	0.018	0.019	0.002	5.698	0.370	4.138	0.241
TOTAL	0.525		0.059		17.430		12.658	
Green buildings determinant for location choice								
Location_GreenBuildi	2.935	0.152	3.832	0.151	0.013	0.000	0.467	0.013
Location_notGreenBui	1.426	0.152	1.861	0.151	0.006	0.000	0.227	0.013
TOTAL	4.361		5.693		0.019		0.693	
District profile determinant for location choice								
Location_DistrictPro	0.830	0.068	0.591	0.037	4.149	0.208	5.800	0.261
Location_notDistrict	1.131	0.068	0.805	0.037	5.658	0.208	7.909	0.261
TOTAL	1.961		1.396		9.808		13.710	
WorkplaceManager								
notWPmanager	3.553	0.358	0.418	0.032	0.605	0.037	0.005	0.000
WPmanager	6.712	0.358	0.789	0.032	1.144	0.037	0.010	0.000
TOTAL	10.265		1.207		1.749		0.015	
Impact of WP on wellbeing								
notWellBeing	3.130	0.405	0.975	0.096	0.298	0.023	0.206	0.015
WellBeing	8.496	0.405	2.647	0.096	0.808	0.023	0.560	0.015
TOTAL	11.626		3.622		1.106		0.766	
Impact of WP on Performance								
notPerformance	0.678	0.154	0.901	0.155	0.065	0.009	0.519	0.064
Performance	3.727	0.154	4.958	0.155	0.357	0.009	2.855	0.064
TOTAL	4.405		5.859		0.422		3.374	
Head Office Location								
Zone 1	0.839	0.076	0.291	0.020	1.084	0.060	0.261	0.013
Zone 2	0.832	0.039	6.611	0.233	1.791	0.051	0.595	0.015
Zone 3	0.511	0.021	5.524	0.169	16.406	0.402	0.002	0.000
TOTAL	2.181		12.426		19.281		0.858	
Sector								
Industrial sector	1.674	0.101	0.018	0.001	5.406	0.199	9.092	0.300
Service sector	1.228	0.101	0.013	0.001	3.964	0.199	6.668	0.300
TOTAL	2.901		0.031		9.370		15.760	

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