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# Intellectual capital and sustainable development on islands

## An application to the case of Gran Canaria

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# Intellectual capital and sustainable development on islands

## An application to the case of Gran Canaria

*Keywords: intellectual capital, island territory, sustainable development.*

*JEL CODES: O1;O;Q56;R5*

### *Abstract*

Sustainable development is an objective for any territory, especially when the territory is a small island. To achieve the goal of development and conservation of natural resources, the ideal would be to base a good part of the island's economy on intangible assets, such as the culture or knowledge, since they neither depreciate nor erode with use. This work proposes a model designed to enable the identification and measurement of the principal intangible assets that contribute to island territories' achievement of sustainable development. In this work, the model is applied to the island of Gran Canaria (Spain).

## Introduction

Until the beginning of the 19<sup>th</sup> Century, the creation of wealth was based on the possession of lands. However, with the coming of the Industrial Revolution, all that changed and wealth was generated through a combination of capital, raw materials and work. Finally, in the 1980's, supported by the tremendous advances in the development of telecommunications and information technologies, the economy of intangibles appeared, with aspects like innovation and knowledge, the leading exponents of the creation of wealth (Bradley, 1997a; Edvinsson, 2000; Fruin, 2000; Viedma Marti, 2000).

Focusing attention on the key element of this work, namely, intellectual capital, it should be mentioned that no single definition is shared by all authors. However, one of the most used is that which defines intellectual capital as the combination of non-material or intangible assets that generate, or will generate, added value for the organization owning them (Bradley, 1997a; Edvinsson and Sullivan, 1996; Euroforum, 1998; Stewart, 1991; Unión Fenosa, 1999). Another frequently used definition considers that intellectual capital is the difference between the market value and the book value of the firm (Brooking, 1997a, 1997b; Daley, 2001; Harvey and Lusch, 1999; Lev, 2001; Nevado Peña and López Ruiz, 2002; Ordóñez de Pablos, 1999, 2003; Pasher, 1999; Petrash, 1996; Sveiby, 2000).

However, the importance of intellectual capital is not confined to companies. In fact, an increasing number of authors believe that this type of asset is of the utmost importance to territories, with Bradley (1997a, 1997b), Bontis (2002,

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2  
3 2004), Daley (2001), Edvinsson (2002), Edvinsson and Stenfelt (1999),  
4  
5 Malhotra (2000) and Pasher (1999) standing out among those authors. In this  
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7 respect, the interest that territories have in intellectual capital lies in the fact  
8  
9 that, in the future, this type of resource will be one of the most important factors  
10  
11 for social and economic development. Thus, it will be the countries that are  
12  
13 better equipped with this type of capital that will make most progress (Daley,  
14  
15 2000; Edvinsson, 2002; Malhotra, 2000). Therefore, the importance of  
16  
17 intellectual capital to any type of territory becomes even greater in small, island  
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19 territories. These territories are characterized by a shortage of tangible  
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21 resources and, being sensitive to their exploitation, could base their  
22  
23 development on intangible assets and so conserve their natural resources.  
24  
25 Thus, if the concept of intellectual capital is applied to a geographical area, it  
26  
27 can be defined as the territory's ability to transform knowledge and intangible  
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29 resources into wealth (Bradley, 1997a). Bontis (2004) considers that it includes  
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31 the hidden values of individuals, firms or institutions, communities or regions  
32  
33 that are sources to create real or potential wealth. On the same lines, Malhotra  
34  
35 (2000) defines it as those hidden assets on which the country's growth is based,  
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37 and the added value of the stakeholders living there.  
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48 Regarding the models that have been used to measure intellectual capital,  
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50 many tools have appeared in recent years. Those most referred to in the  
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52 literature include the Skandia navigator (Edvinsson and Malone, 1999), the  
53  
54 intangible asset monitor (Sveiby, 2000) and the balanced scorecard (Kaplan  
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56 and Norton, 1997). The model used in the case of territories was an adaptation  
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58 of the Skandia navigator for countries (Edvinsson and Stenfelt, 1999). However,  
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3 and despite the proliferation of models of intellectual capital in recent years,  
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5 when establishing a classification of the elements comprising this type of  
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7 capital, there seems to be some consensus about dividing intellectual capital  
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9 into three large components: human capital, structural capital and relational  
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11 capital (Bontis, 2002; Petty and Guthrie, 2000; Ordóñez de Pablos, 2002, 2003;  
12  
13 Roos *et al.*, 2001; Viedma Marti, 2001). That division is also applicable in the  
14  
15 case of territories although some modifications must first be made to each of  
16  
17 the components (Bontis, 2004). According to Bontis (2002, 2004), a country's  
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19 human capital can be defined as the sum of its citizens' knowledge, education  
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21 and capabilities. Structural capital comprises those intellectual assets that,  
22  
23 unlike human capital, can be appropriated by the country, which makes it  
24  
25 possible to perform economic transactions with them (Malhotra, 2000). Lastly,  
26  
27 relational capital, which in the case of territories is called market capital, refers  
28  
29 to its ability to provide competitive solutions for international customers (Bontis,  
30  
31 2004). In other words, it refers to the value of the commercial relationships that  
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33 the country maintains with its suppliers and customers in the global market  
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35 (Malhotra, 2000; Pasher, 1999).  
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#### 46 Proposal of the model

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48 In light of the social debate on how to grow economically and socially without  
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50 creating inequalities, damaging the environment or mortgaging the future, this  
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52 work proposes a model that attempts to provide a tool that, by measuring  
53  
54 intangible assets, contributes to small, island territories achieving sustainable  
55  
56 development. This objective differs from that proposed by Edvinsson and  
57  
58 Stenfelt (1999) in two significant ways. The first lies in the fact that it is applied  
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3 to a particular type of territory, small islands, where intangible asset based  
4 development would have positive results. The second is that the model should  
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6 only include assets that contribute wealth and do so, or have the potential to do so, in a  
7  
8 sustainable way. Therefore, it is necessary to clarify the concepts of *sustainable*  
9  
10 *development* and *small, island territory*.  
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### 15 16 17 *Sustainable development*

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19 Since the World Commission on Environment and Development commissioned  
20 the Prime Minister of Norway, Gro Harlem Brundtland to write a report, which  
21  
22 was published under the title *Our Common Future*, much has been written  
23  
24 about the concept of sustainable development. That report states that  
25  
26 sustainable development is the kind of development that satisfies the needs of  
27  
28 the present without compromising those of the future. It also states that it is not  
29  
30 a permanent state of harmony; on the contrary, it is a dynamic, changing  
31  
32 process where the exploitation of resources, the destination of investments,  
33  
34 orientation of technological development and institutional changes are directed  
35  
36 toward satisfying present and future necessities (World Commission on  
37  
38 Environment and Development, 1987).  
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48 Sustainable development must consider the existence of a balance between  
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50 social, environmental and economic aspects. However, that balance does not  
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52 always occur; in fact, as Shearlock *et al.* (2000) state, the importance of each of  
53  
54 the factors to the achievement of sustainable development is not clearly  
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56 defined. On the same lines, Selman (2000) indicates that there are many  
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58 definitions of sustainable development and, however, they all include  
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3 inseparable environmental, social and economic parameters. Similarly,  
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5 Shearlock *et al.* (2000) maintains that sustainable development policies require  
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7 the integration of those three political areas that have traditionally been  
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9 separated.  
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15 However, that definition of sustainable development, which, according to  
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17 Naredo (1998), is widely accepted, also has its critics. Giddings *et al.* (2002)  
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19 describe it as ambiguous and political, and Giddings *et al.* (2002) and Selman  
20  
21 (2000) maintain that it has numerous meanings that are interpreted differently  
22  
23 depending on who is going to use it –*e.g.*, governments, company managers,  
24  
25 ecologists, etc.  
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31 For Haughton (1999), apart from the existence of a balance between the social,  
32  
33 environmental and economic aspects, five principles of equity must also be  
34  
35 considered in any discussion on sustainable development. If those five  
36  
37 principles are not taken into account individually and collectively, he argues that  
38  
39 it is inevitable that the capability to achieve sustainable development is critically  
40  
41 undetermined. The principles are: a) *intergenerational equity* or principle of  
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43 futurity, which aims for present construction without compromising the future; b)  
44  
45 *intra-generational equity*, which advocates social equity; c) *geographical equity*,  
46  
47 which means that local policies are adopted to solve environmental problems at  
48  
49 a local level but also at a global level; d) *procedural equity*, which aims to  
50  
51 guarantee that the participatory legislative system assures fair and open  
52  
53 treatment for all, and finally, e) *inter-species equity*, which states that the  
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3 survival of other species is taken into consideration in the same way as the  
4 survival of the human species.  
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10 Works on sustainable development should bear in mind that there are two  
11 schools of thought, the strong sustainable and the weak sustainable. The  
12 former advocates the maintenance of natural capital, which involves renouncing  
13 economic growth since the production of manufactured capital requires the use  
14 of natural capital Simon (2003). Hence, if economic and demographic growth is  
15 not halted, adjustments will automatically take place, which will put a brake on  
16 these non-sustainable tendencies (Goldsmith, 1972; Ehrlich and Ehrlich, 1993;  
17 Meadows, 1994). On the other hand, according to Simon (2003), the weak  
18 sustainable school is more optimistic since it considers that there can be some  
19 substitution between man-made capital and natural capital, in a way that  
20 development will be possible but it can not be unlimited. However, as the  
21 Brundtland report states, that limit is not fixed but depends on aspects such as  
22 the present state of technology or the existing social organization (World  
23 Commission on Environment and Development, 1987). The model proposed in  
24 this work falls within that second school of thought.  
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#### 48 *Small, island territory*

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50 There is no doubt that the size and isolation of territories of this type gives them  
51 certain peculiarities that do not occur in continental territories. So, according to  
52 McElroy (2000), small islands suffer a series of limitations stemming from those  
53 conditions that mean they are disadvantaged from an economic point of view  
54 (Briguglio, 1995). In this respect, one of the problems lies in the shortage of  
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3 natural resources, which leads to a high dependence on the exterior, both for  
4  
5 exports and imports. On the same lines, the territory's restrictions mean that the  
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7 internal market is very small to absorb a high internal production, while there is  
8  
9 little possibility of substituting imports with local products (Briguglio, 1995). All  
10  
11 this results in the governments of these territories having to be sure to identify  
12  
13 and exploit the island's characteristics that may represent a competitive  
14  
15 advantage (Mehmet and Tahiroglu, 2002). It should also be stressed that the  
16  
17 manufacturers in small, island territories are not usually competitive, due to the  
18  
19 additional cost of necessarily importing raw materials. Consequently, these  
20  
21 territories can be considered centers of consumption of manufactured goods  
22  
23 that have to be imported. Moreover, the territorial limitations mean that there is  
24  
25 little business diversification (Briguglio, 1995; McElroy, 2000; United Nations  
26  
27 General Assembly, 1998). Other aspects to be considered are the low ability to  
28  
29 influence prices in the local and export markets, little internal competitiveness  
30  
31 and few possibilities of taking advantage of economies of scale (Briguglio, 1995;  
32  
33 McElroy, 2000). Other limitations stemming from insularity and distance are the  
34  
35 high transport costs, the uncertainty about suppliers and the need to maintain  
36  
37 high *stocks* (Briguglio, 1995; McElroy, 2000).  
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48 All island territories also have some peculiarities in common, such as the  
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50 possibility of natural disasters (Armstrong, 2001; Briguglio, 1995; Debance,  
51  
52 1999) and the fragile natural environment. The latter means that any activity in  
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54 these territories has significant repercussions on their environments (Armstrong,  
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56 2001; Briguglio, 1995).  
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3 In spite of all the above, in many cases, island economies have achieved  
4 spectacular growth rates, especially in sectors such a finance, banking and  
5 tourism; the last of those being supported by the natural attraction of many  
6 islands. However, for that growth to be maintained over time, it is essential to  
7 have a qualified work-force (Mehmet and Tahiroglu, 2002).  
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17 All of that leads us to consider that, in this type of territory, development based  
18 on intangible assets could be more sustainable that if it were based on material  
19 assets.  
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### 27 *Presentation of the model*

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29 After the definitions of the above concepts, which guided the design of this  
30 model, it should be mentioned that, as Figure 1 shows, the model comprises  
31 seven categories, six for each of the types of intellectual capital identified in this  
32 work, and one that reflects the accumulation of intangible assets of the other  
33 groups. The categories are: tourism capital, economic activity capital, social  
34 capital, environmental capital, public administration capital, training and  
35 development capital and result capital. This is not the traditional division of  
36 intellectual capital. The reason for stressing categories based on functionality  
37 rather than on the nature of the assets (human, structural and relational capital)  
38 is that it was thought more suitable address the functional and organic  
39 organization that characterized public administration. This may facilitate its  
40 implementation and its identification with the objectives of that administration.  
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42 Furthermore, these groups must not be seen as separate compartments; it is  
43 necessary to be conscious that there are important links between them, which is  
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3 essential for correct management. Finally, and before defining the categories, it  
4  
5 should be explained that each category may contain sub-categories; in other  
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7 words, second level categories of intellectual capital can be established. Within  
8  
9 the groups and any existing sub-groups, the intangible assets that should be  
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11 managed and suitable indicators to measure them must be identified.  
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Take in Figure 1

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25 Beginning with tourism capital, this category comprises those intangible assets  
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27 that are strategic to the tourism sector and includes those related to the supply  
28  
29 as well as those related to the demand. The reason for giving tourism a  
30  
31 separate category from other economic activities is that, as Debance (1999),  
32  
33 Mehmet and Tahiroglu (2002) and McElroy (2000) state, it is the activity that  
34  
35 usually has more weight in most small, island economies. In fact, tourism is the  
36  
37 main economic activity in 70% of European islands and is responsible for 50%  
38  
39 of GDP in one third of them (García Falcón and Medina Muñoz, 1999). Some  
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41 examples of intangible assets in this category are: the quality of  
42  
43 accommodation, the image of the destination and tourist loyalty.  
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51 Economic activity capital includes all the non-material assets that are  
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53 fundamental to the other economic activities taking place in a territory (*e.g.*,  
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55 agriculture, livestock, fisheries, construction, industry, commerce and services).  
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57 The presence of this category in the model is justified by the economic, social  
58  
59 and environmental impact of business activities. Some of the intangible assets  
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3 that can be included in this category are: company competitiveness,  
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5 productivity, image and the workplace accident rate.  
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10 Social capital covers all those intangible assets whose development improves  
11 the social strength of the territory. We should make it clear that the term social  
12 capital defined in this way does not exactly coincide with what is understood in  
13 the works like those of Coleman (1988, 1990), Dasgupta (2000), Fine (1998),  
14 Putnam (1995) or Woolcok (2002). So this category comprises the non-material  
15 resources linked to areas such as health, housing, employment, immigration,  
16 culture, sport, women, youth, public safety, justice, etc. Each of those areas can  
17 be broken down into subcategories that permit a more structured study to be  
18 made of their respective assets. The importance of this category in the model is  
19 irrefutable, since, as Gladwin *et al.* (1995), Gobierno de Canarias (2002),  
20 Selman (2000), Shearlock *et al.* (2000) and Wilson and Buller (2001) state, it is  
21 impossible to understand sustainable development if it is not accompanied by  
22 balance and social justice. Some of the assets to be included in this category  
23 are: equality between the sexes, the integration of immigrants, quality of health  
24 and quality of jobs.  
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48 Environmental capital comprises the intangible assets whose development is a  
49 determinant in conserving the environment. In this respect, it should be borne in  
50 mind that, if this type of capital is of extreme importance in any territory, in  
51 small, islands it is essential because of the fragility typical of their environment.  
52 This category comprises intangible assets related to aspects such as water,  
53 waste, energy, rural environment and urban environment. The assets within this  
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3 category include environmental health, air quality, deterioration of the territory,  
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5 the impact of producing energy, the decline in aquifers, concern for  
6  
7 environmental health and a water-saving conscience.  
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12 Public administration capital refers to all those intangible assets that are crucial  
13  
14 for the island's public administrations to function correctly. This category  
15  
16 attempts to capture, through the intangible assets, the local and island  
17  
18 administrations' ability to adapt to the citizens' needs and expectations of social,  
19  
20 environmental and economic development, and to do so efficiently. Finally,  
21  
22 some examples of the assets included in this category are: the efficiency and  
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24 flexibility of the public institutions and the citizens' satisfaction with those  
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26 institutions.  
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34 Training and development capital covers all those intangible assets that are vital  
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36 both to the training and to the research and development that take place on an  
37  
38 island. Therefore, any improvements in this block of intellectual capital will have  
39  
40 a positive future impact, either directly or indirectly, on the other categories. The  
41  
42 intangible assets comprising this category relate to education, research,  
43  
44 innovation and the information society. Some examples of this type of asset are  
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46 education quality, technological independence and the applicability of what is  
47  
48 researched.  
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55 The result capital group is conceived as one synthetically comprising what  
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57 occurs in the other categories. In this respect, this category comprises only one  
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59 asset. This is calculated as the weighted average of the values of the different  
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3 categories, which are related both to the territory's economic competitiveness  
4 and to social and environmental aspects. Therefore, this category can be  
5 considered a measure of the sustainability of the activities performed in the  
6 territory. Moreover, it is proposed that, together with the indicator of this asset,  
7 another indicator is used to measure the generation of wealth in the territory  
8 (e.g., per capita income), thus permitting a direct observation of the creation of  
9 wealth taking place on the island.  
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22 As previously mentioned, relationships exist between determined assets from  
23 the different dimensions. We now give some examples of such relationships,  
24 which are indicated by arrows in Figure 1. Thus, intangible assets in the  
25 environmental dimension, such as the impact of producing energy or the decline  
26 in aquifers, are clearly seen to be influenced by the quality of the relevant  
27 research and development, which is an asset in the subcategory university,  
28 science and technology. Furthermore, if we consider that, by their actions,  
29 governments aim to mitigate environmental problems selectively and establish  
30 economic policies that are sustainable from an ecological point of view  
31 (Shrivastava, 1995), it is reasonable to assume that there is a connection  
32 between public administration capital and environmental capital.  
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51 There is also a relationship between social capital and the environment (Pretty  
52 and Ward, 2001), with a two-way link between them. Thus factors such as  
53 culture or demographic pressure affect the environment or the deterioration of  
54 the territory, while in the opposite direction, assets like water quality or pollution  
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3 directly affect assets included in social capital –e.g., the health of the  
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5 population.  
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10 There is another possible relationship between training and development capital  
11 and environmental capital and social capital. There is no doubt that an educated  
12 society has a positive impact on the environment and social tolerance.  
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18 The underlying philosophy of the model, which is based on obtaining economic,  
19 social and environmental development by means of intangible assets, means  
20 that such development is obtained by minimizing the negative impacts on  
21 nature, both at a local and a global level. Thus, we believe that the proposed  
22 model is in line with the principles proposed by Haughton (1999), which have  
23 been included in the model although not all with the same depth. For each of  
24 those principles, we now list some assets included in the model, and whose  
25 existence can be used to control whether the principles are being complied with.  
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41 Thus, the assets related to *intergenerational equity* include a conscience not to  
42 generate waste, a recycling conscience, saving energy and water consumption,  
43 and environmental education, all of which fall within the environment category.  
44 These assets contribute to environmental conservation and consequently to  
45 future generations' ability to enjoy the environment. Moreover, other aspects,  
46 such as quality research and education, both within the category of training and  
47 development, and a conscience to produce ecologically, the quality and  
48 modernization of industry, within the category of economic activity, are also  
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3 determinant in the improvement of present resources and their consequent  
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10 The assets related to *intra-generational equity* or social justice are found within  
11 the social category. Thus, the sub-category of community health includes  
12 intangibles such as the health of the population and health promotion, while  
13 equality of the sexes and social volunteer conscience fall within the sub-  
14 category of groups under social protection. The sub-category of housing  
15 includes accessibility and habitability of housing, while the sub-category of  
16 employment includes job stability and social peace. There is no doubt that the  
17 existence of those assets in a territory constitutes a clear sign of the existence  
18 of social equality.  
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34 Intangible assets associated with *procedural equity* are found included in  
35 various sub-categories in the model. Thus, the sub-category of employment  
36 contains assets such as good labor relations peace, job stability and adequate  
37 working conditions, while the sub-category groups under social protection  
38 contains equality of the sexes. All of those are assets that may be an indirect  
39 reflection of a fair and participatory legislation system. However, it is clear that  
40 this principle is under-represented in the model. In any case, it should be noted  
41 that to a great extent, compliance with this principle does not depend on the  
42 island authorities since the legislative competence of those authorities is limited  
43 because the island is not an independent state.  
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3 Of the categories proposed by Haughton (1999), it is perhaps the principle of  
4 *geographical equity*, together with the above principle, that is most understated  
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6 in the model. The reason for that deficit lies in the fact that the territory under  
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8 study covers a small surface area, which means that the capacity to influence  
9  
10 on a global level is limited. However, assets that may be linked to this principle  
11  
12 are taken into account. Thus, the sub-category of energy and water includes  
13  
14 assets such as saving energy consumption, saving water and energy  
15  
16 diversification. If those assets are in good condition, it means that energy and  
17  
18 water are being saved and the former is being produced from renewable  
19  
20 sources. This means that fewer pollutants are emitted into the atmosphere,  
21  
22 which consequently helps not to increase the greenhouse effect. The sub-  
23  
24 category of industry and construction includes the modernization of industry; an  
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26 asset that contributes to a more efficient use of resources. Thus, as most of the  
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28 raw materials used in the islands have to be imported; this helps to reduce the  
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30 deterioration of the territories that export them.  
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41 Finally, the assets related to *interspecies principle* are predominantly found in  
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43 the category of environment and include assets such as the protection and  
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45 sustainable exploitation of the environment and environmental education, which  
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47 fall within the rural and urban sub-category, and an ecosystem habitat  
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49 conscience which is included in the category of waste and recycling. Other  
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51 assets belonging to the environmental category are also indirectly related to this  
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53 principle; for example, energy and water saving contributes to less pollution and  
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55 consequently to less deterioration of the habitats of other species.  
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3 The intellectual capital of Gran Canaria: an application  
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5 *Antecedents*  
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8 Gran Canaria is an island forming part of the Canarian Archipelago, has a  
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10 surface area of 1,560.10 square kilometers (602.36 square miles) and is almost  
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12 circular, with a maximum diameter of 53.5 kilometers. Its location in the Atlantic  
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14 Ocean, more than 1,000 kilometers from Continental Europe, means that,  
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16 together with the other Canary Islands, it is considered an outermost region of  
17  
18 the European Union. There are 771,333 inhabitants, a figure representing  
19  
20 approximately 45% of the archipelago's total. As regards economic activity, in  
21  
22 relatively few years, the island has changed from having a preeminent  
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24 agricultural sector to being one of the most important tourist destinations in  
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26 Spain (Hansen Machín and Domínguez Mújica, 1993).  
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34 *Application of the model*  
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36 The first step in applying the proposed model to Gran Canaria was to identify  
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38 the general objective of the territory. In this respect, The Social and Economic  
39  
40 Strategic Plan for Gran Canaria establishes it as “[...] To improve the national  
41  
42 and international competitiveness of Gran Canaria to guarantee sustained  
43  
44 economic growth with adequate conservation of natural resources and an  
45  
46 improvement of the quality of life of its citizens” (Cabildo de Gran Canaria,  
47  
48 2001:13). Taking that objective into account, the model proposed in this work is  
49  
50 especially suitable, since it was designed for the achievement of sustainable  
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52 development by the territory and, to that end, includes economic as well as  
53  
54 social and environmental aspects.  
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3 When establishing the categories of the model to be applied to Gran Canaria,  
4 and in order to capture a more detailed, complete picture of the island reality,  
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6 most of the categories were divided into subcategories. Table I shows the final  
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8 configuration of the model.  
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15 Take in Table I  
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20 Once the structure of the model had been determined, the relative weightings of  
21 each of the categories and their subcategories were fixed. This relative  
22 weighting represents the importance of each category and subcategory in  
23 achieving the objective of sustainable development. The results of that  
24 weighting are shown in Table II. It should be stressed that the relative  
25 weightings shown in that table are based on the opinions of 61 consulted  
26 experts. The weightings of the different categories were all given quite similar  
27 values, although the highest valued was the category of training and  
28 development while the least valued was public administration, which was the  
29 only category whose average value was significantly below the overall average.  
30 Another notable result is that the categories that include intangible assets  
31 related to tourism and the environment were considered more relevant to  
32 obtaining sustainable development than those associated with the social  
33 category.  
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55 It should be stressed that for the purposes of this work, an expert is considered  
56 to be an individual with a broad knowledge the relevant topic. Thus, the experts  
57 include: the University Rector and manager, professors, ecologists, business  
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3 consultants, doctors, researchers, entrepreneurs, public managers, heads of  
4 business organizations, trade union leaders, university lecturers, primary and  
5 secondary teachers, etc. The experts were chosen in such a way that there  
6 were at least three for each of the proposed subcategories. Moreover, the  
7 particular knowledge of each expert allowed as many perspectives of the topic  
8 as possible. For example, in the case of the subcategory rural and urban  
9 environment there was an ecologist, a university lecturer, a manager from the  
10 public administration and a civil servant, while the experts in the subcategory  
11 waste and recycling were a politician, an ecologist, a university lecturer and a  
12 manager of a private company responsible for waste management on the  
13 island. To be specific, and in line with the proposal of Simon (2003), the experts  
14 contributing to operationalize the term sustainability represent all the  
15 stakeholders that should be involved in that achieving sustainable development.  
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36 The heterogeneity of the informants' training and/or activity undoubtedly incurs  
37 the risk of low levels of homogeneity in the responses. However, it was decided  
38 to use that methodology rather than others, such as a survey of the resident  
39 population, because, although the contribution of a greater number of people  
40 was lost, it was possible to obtain deeper and more precise knowledge of the  
41 intangible assets that contribute, or could contribute, to the sustainable  
42 development of the island. A review of the literature was undertaken but it was  
43 not significant in determining the weights of the assets and categories.  
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57 Another problem associated to the use of experts to set the loadings in the  
58 model is that they may not be impartial and so give higher loadings to their  
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3 personal preferences. However, in selecting the experts great care was taken to  
4  
5 ensure that business, social and environmental specialists were represented in  
6  
7 the final selection. This balanced panel of experts and the fact that the loadings  
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9 were established as the averages of all the experts mean that any possible  
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11 deviances tend to self-compensate.  
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17 In order to make sure that all the experts understood and had the same notion  
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19 of the meaning of sustainable development, prior to the interviews they were  
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21 informed of what was understood by sustainable development for the purposes  
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23 of this work. Furthermore, during the selection of experts it was ensured that  
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25 they had previously participated in the preparation of the Strategic Plan for the  
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27 Gran Canaria, a document setting out the principle strategies to achieve  
28  
29 sustainable development in the territory, and that they shared the same  
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31 conception of the term. A similar procedure was followed in the case of  
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33 intellectual capital, so that they all had the same concept of the meaning before  
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35 the interviews took place.  
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44 With regard to how the problem was presented to the experts, it should be  
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46 mentioned that it was proposed that they endeavor to identify the most  
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48 significant intangible assets that determine that a small island territory,  
49  
50 specifically Gran Canaria, can achieve sustainable development. As previously  
51  
52 mentioned, the first step was to clarify the concepts of intellectual capital and  
53  
54 sustainable development. Then the experts were given the categories of  
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56 intangible assets that were proposed in the model as a result of the review of  
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58 the literature and a study of the island's organization. The next step was to ask  
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3 the experts to propose the assets that should be included in each of the  
4 subcategories in which they were experts, and the most appropriate indicators  
5 to measure them. When all the opinions had been collected, a list of all the  
6 assets and indicators proposed for each subcategory was drawn up. That list  
7 was then given to the experts, who were asked to put the assets proposed by  
8 themselves and the other experts in the same subcategory in order of the  
9 importance that they attached to them, and to evaluate their present condition  
10 on Gran Canaria. The results of this stage identified the assets and indicators  
11 that would be included in the model. The experts were then given the list of  
12 definitive assets in each subcategory and asked to evaluate each of the  
13 subcategories in the category in which they were experts. The weight of each of  
14 the subcategories was calculated from the average evaluation of the experts.  
15 Finally, the importance of each dimension to the achievement of sustainable  
16 development for Gran Canaria was established by asking all the experts for  
17 their opinions. Thus, Table III shows all the assets used in this work, together  
18 with the importance assigned to them within their categories or subcategories,  
19 while Table IV shows their present situation according to the team of experts.  
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46 Take in Table II

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50 Take in Table III

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55 Take in Table IV  
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3 The next step was to measure all the proposed assets by means of their  
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The next step was to measure all the proposed assets by means of their respective indicators. Those measurements were calculated using secondary sources of information such as the Canarian Autonomous Government, the Gran Canaria Island Council and the Canarian Institute of Statistics.

Finally, the index of sustainability was constructed from the accumulation of the partial indexes of each category and subcategory. The value of an index calculated in that way is that it can be used to make comparisons with that for the same territory in a different period of time, or for other territories in the same period of time. In the first case, it would permit the evolution of the island's sustainability of development to be observed and, in the second, it can be used to compare it to that of another territory. In this work, the second option was chosen, with Tenerife as the second territory.

The need for systems of sustainability indicators is widely recognized and great efforts have been made in that respect (Simon, 2003). Hence, the attempt to prepare a combined indicator of sustainability, such as that proposed in this work, is nothing new and for years there has been talk about establishing an index based on economical indicators (Neumayer, 1999). However, that type of index has been criticized for attempting to reduce the social and environmental aspects to equations based on economical data. To overcome the problems created when combining measures, there have been some initiatives that have proposed the construction of frameworks of indicators that permit the links between different indicators to be shown. Two examples are the European System of Environmental Pressure Indices and the European System of

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2  
3 Integration of Economic and Environmental Indices constructed by The  
4 Commission of the European Communities (1996). For their part, Ekins and  
5 Simon (1999, 2001) developed a framework of indicators that shows how  
6 economic activities affect ecological functions. Although these frameworks must  
7 be seen as more complex systems than the simple combination of indicators,  
8 there is no doubt that they may be controversial. However, some of them have  
9 proved to be effective in their use by legislators (Simon, 2003).

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22 The model proposed in this work also aims to establish a series of indexes to  
23 measure sustainable development of the island territory where it is applied. To  
24 construct the model, the values of the indicators used to measure the proposed  
25 intangible assets were loaded according their importance and then combined.

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34 As previously mentioned, the model is structured in categories containing  
35 subcategories. Each of those categories comprises a series of assets that are  
36 measured by means of a series of indicators. The indexes are calculated in an  
37 upside-down fashion, so that the index values of the assets are calculated first,  
38 then those of the subcategories and finally those of the categories. Since not all  
39 the indicators represent the asset in the same way, the measurements are  
40 loaded according to the importance of each indicator. This form of combination  
41 is possible because each of the measured values is divided by a base value,  
42 which corresponds to the measurement values for each indicator on Gran  
43 Canaria. Thus, the value that reflects Gran Canaria in each indicator is 1,  
44 making the resulting values easy to compare. Once the index values of the  
45 assets of each subcategory had been obtained, they were combined to obtain

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3 the value of the subcategory. Since not all the assets have the same  
4 importance within the subcategory, the sum was calculated by loading the  
5 values according to their importance within the subcategory. The next step was  
6 to combine the subcategory values, also loaded according to importance, to  
7 obtain index values for the categories. Finally, the same process was used for  
8 the categories to obtain an index total for sustainability.  
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20 Obviously, the loadings assigned to the variables and dimensions could be  
21 crucial. However, in no way does this work claim that those established for Gran  
22 Canaria are suitable for any other territory. In fact, each territory should  
23 establish the loadings most suited to its social, environmental and economic  
24 characteristics. Hence, if this work applies the same loadings to Gran Canaria  
25 and Tenerife, it is because the two islands are very similar in those three  
26 aspects. The same problem occurs in models of intellectual capital applied to  
27 firms, since an intangible asset that is vital to one firm may be irrelevant to  
28 another. That circumstance minimizes the homogeneity of results and the  
29 usefulness of making comparisons between firms, although it does not detract  
30 from the increasing importance of measuring and controlling the intangible  
31 assets that they possess.  
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50 Due to the way in which the indexes in this work are constructed, the managing  
51 authorities may be tempted to reinforce certain assets at the expense of others  
52 because that action might not affect the index. This substitution problem may  
53 lead, for example, to not reinforcing determined assets related to nature or  
54 social affairs while doing so with those linked to economic activity. However, it  
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3 should be made clear that, first, the proposed model is based on intangible  
4 assets whose reinforcement does not damage natural resources and, second,  
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6 since there is a positive relationship between the different dimensions, the  
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8 improvement of an asset in a particular dimension can contribute to the  
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10 improvement of assets in other dimensions. Thus, if the asset ecological  
11  
12 production awareness is improved, it leads to improvements in other intangible  
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14 assets related to the environment. Moreover, the model permits minimum  
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16 objectives to be established for each asset if there is a desire for no imbalances  
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18 in the promotion of assets.  
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27 The problem is that, to determine those values, it would be appropriate to have  
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29 performed various measurements. Moreover, excessive substitution can easily  
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31 be avoided if the partial indexes, as well as the overall index, are taken into  
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33 account.  
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39 To be able to interpret the results of the indexes obtained (see Tables V and  
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41 VI), it must be remembered that these are the indexes for Gran Canaria in  
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43 relation to those for Tenerife, with the former taking the value of 1. Thus, the  
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45 distance from a value of 1 for any index must be interpreted as the difference in  
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47 the situation between the two islands regarding the group of analyzed assets.  
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49 Therefore, if the index is lower than 1, it indicates that, in general terms, the  
50  
51 situation of Gran Canaria is better than that of Tenerife. Similarly, the  
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53 observations about the partial indexes for each category, subcategory and  
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55 asset provide more detailed information that will permit the formulation of the  
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3 actions to be taken in order to achieve the objective of sustainable  
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5 development.  
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10 The results obtained indicate that the overall result included in the category  
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12 “result” reflects that Tenerife is growing in a more sustained way than Gran  
13  
14 Canaria. However, it should be stressed that the difference between the two  
15  
16 islands is only 2.86%. In the case of the partial indexes that comprise the  
17  
18 general index, the results for Gran Canaria show higher values for the  
19  
20 categories of environment, public administration and training and development,  
21  
22 especially in the case of public administration, which was 20% better than in  
23  
24 Tenerife. However, the partial indexes for the tourism, economic activity and  
25  
26 social categories have higher values for Tenerife, with the value for economic  
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28 activity exceeding that of Gran Canaria by more than 30%. Those data reflect  
29  
30 that Tenerife surpasses Gran Canaria in all the indexes related to business  
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32 activity, except in the case of commerce and services. Therefore, it is not  
33  
34 surprising that the indicator of the generation of wealth, in other words the value  
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36 added per inhabitant is also higher in Tenerife. All that leads to the conclusion  
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38 that Tenerife is growing more than Gran Canaria and, according to the index of  
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40 sustainability constructed in this work, that growth is more sustainable.  
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51 Take in Table V  
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55 Take in Table VI  
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## Conclusions

The importance of intangible assets in organizations has been increasing in recent years. However, that phenomenon is not confined to the context of companies; it can also affect territories. That importance is, if possible, even greater in small, island territories, a type of territory characterized by its fragility, shortage of resources, little possibility of local companies to influence prices, low internal competitiveness, little business diversity, etc. In addition, territories are interested in their development being sustainable development, understood as that which satisfies present needs without compromising those of the future. The construction of the model in this work led to the design of a tool which, by measuring and evaluating intangible assets, contributes to obtaining sustainable development in small, island territories. Moreover, its application to Gran Canaria means that, using a series of indicators, the intangible assets of that island are identified, measured and evaluated, and a series of indexes were calculated. The purpose of those indexes is to reflect both the accumulated value of those intangible assets and the sustainability of development in a small, island territory.

The main practical implication of this study is for managers of public administrations of islands, who can find the answers to which intangible assets the territory must possess to achieve sustainable development, and what the present condition of those assets is. Moreover, the structure of the model means that both longitudinal and transversal comparisons can be made with other territories. Moreover, there should be no reason for those comparisons to include all the variables of the model, but they can be made with only the

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3 variables of one part of the model (e.g. those belonging to a specific dimension,  
4 sub-dimension or group of assets). For example, the variables of the  
5 environmental dimensions may be compared with those of an island territory  
6 that represents a global reference in that aspect. Thus, we could have some  
7 values that serve as a goal for the island to achieve. In the case of this study,  
8 the comparisons were between the islands of Gran Canaria and Tenerife.  
9 Furthermore, the proposed model attempts to respond to Malhotra (2000), who  
10 stated that the leaders of national economies should aim to have reliable  
11 mechanisms available to measure knowledge resources in order to understand  
12 how those assets are related to the country's future actions. That author states  
13 that if national politicians and leaders wish to take decisions that permit their  
14 territories to increase their performance and future growth, they must have tools  
15 that facilitate the measurement of intellectual capital since this is the basis of  
16 their countries' future wellbeing. In addition, the methodology followed to  
17 implement the model could serve as a way to reflect on the importance of  
18 environmental, social and economic aspects to the achievement of a territory's  
19 sustainable development.  
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46 Another practical implication of the model is that it proposes the existence of  
47 relationships between the different categories and the assets comprising them.  
48 The existence of those associations may lead to the proposal of actions that  
49 permit more efficient improvements in the present condition of a territory's  
50 intellectual capital and consequently in the sustainability of the territory's  
51 development.  
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3 Moreover, the methodology designed in this work can be used to obtain partial  
4 results within each of the categories. For example, representatives of the  
5 business sector could use the indexes and indicators proposed for the  
6 economic activity and tourism categories to improve the contribution of that  
7 sector to the sustainable development of the island. They could also use the  
8 relationships identified between the assets of each subcategory to achieve  
9 more effective processes to accumulate intangible assets.  
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22 Finally, we should mention that the principal innovation of this model lies in the  
23 fact that it is based on intangible assets rather than on physical or financial  
24 assets, as other models are. Therefore, it is based on a type of asset that does  
25 not depreciate with use and whose use does not damage the environment.  
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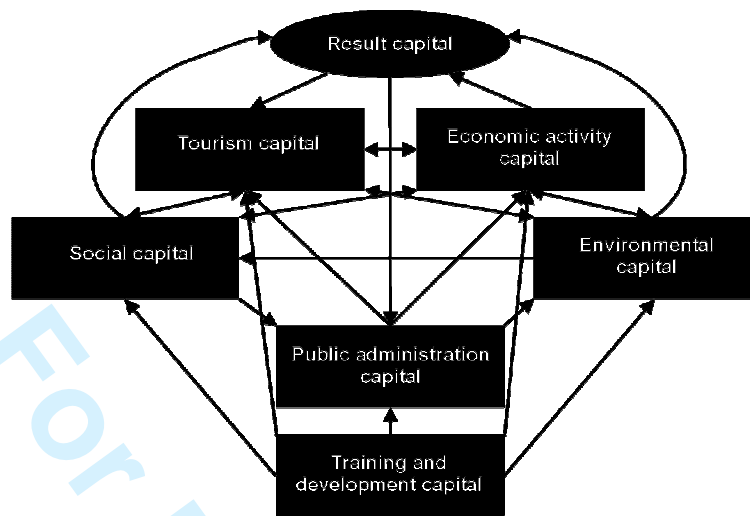
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Figure 1. Model for the measurement of intellectual capital in a small, island territory



Category	Subcategory
Tourism	
Economic activity	<ul style="list-style-type: none"> <li>• Agriculture, livestock and fisheries</li> <li>• Industry and construction</li> <li>• Trade and services</li> </ul>
Social	<ul style="list-style-type: none"> <li>• Employment</li> <li>• Housing</li> <li>• Population groups under social protection</li> <li>• Population and immigration</li> <li>• Public safety</li> <li>• Culture and sports</li> <li>• Community health</li> </ul>
Environment	<ul style="list-style-type: none"> <li>• Energy and water</li> <li>• Waste and recycling</li> <li>• Urban and rural environment</li> </ul>
Public Administration	
Training and development	<ul style="list-style-type: none"> <li>• Primary and secondary</li> <li>• University, science and technology</li> <li>• Professional and vocational training</li> <li>• The information society</li> </ul>
Result	

Categories	Weighting <sup>1</sup>	Subcategories	Weighting <sup>1</sup>
Tourism	18.07		
Economic activity	15.10	Agriculture, livestock and fisheries	23.00
		Industry and construction	33.67
		Trade and services	43.33
Social	16.97	Employment	26.12
		Housing	15.55
		Population groups under social protection	10.86
		Population and immigration	13.15
		Public safety	6.91
		Culture and sports	9.15
		Community health	18.26
Environment	17.34	Energy and water	43.59
		Waste and recycling	25.70
		Rural and urban environment	30.71
Public administration	12.50		
Training and development	20.02	Primary and secondary education	33.33
		University, science and technology	25.00
		Professional and vocational training	22.50
		The information society	19.17

<sup>1</sup> Evaluation of relative importance on a scale of 1 to 100

Category: tourism		Category: economic activity		Category: social	
Asset	Weighting	Subcategory: agriculture, livestock and fisheries		Subcategory: employment	
Loyalty	28	Asset	Weighting	Asset	Weighting
Tourist security	28	Association tendency	40	Job security	39
Image of Gran Canaria	22	Institutional support	36	Capacity to create employment	23
Qualified staff	22	Ecological production awareness	24	Adequate working conditions	21
Category: public administration		Subcategory: industry and construction		Good labour relations	17
Asset	Weighting	Asset	Weighting	Subcategory: housing	
Efficiency	40	Quality	64	Asset	Weighting
Modernization	37	Modernization	36	Accessibility	65
Suitability of staff	23	Subcategory: trade and services		Inhabitability	35
Category: training and development		Asset	Weighting	Subcategory: groups under social protection	
Subcategory: primary and secondary education		Qualification and training of staff	54	Asset	Weighting
Asset	Weighting	Entrepreneurship	27	Quality and guarantee of protection	42
Schooling – regular attendance	46	Quality	19	Public support	25
Quality of teaching	28	Category: environment		Equality between the sexes	20
Absence of classroom conflicts	26	Subcategory: energy and water		Social volunteer conscience	13
Subcategory: university, science and technology		Asset	Weighting	Subcategory: population and immigration	
Asset	Weighting	Savings in energy consumption	46	Asset	Weighting
Teaching quality	39	Savings in water consumption	34	Absence of demographic pressure	46
Research quality	34	Diversification of energy	20	Bio-demographic balance	27
Image	27	Subcategory: waste and recycling		Ability to absorb immigration	27
Subcategory: professional and vocational training		Asset	Weighting	Subcategory: public safety	
Asset	Weighting	Ecosystem-habitat conscience	50	Asset	Weighting
Adequacy of training programs	54	Non-waste-generating conscience	28	Police efficiency	36
Quality of education	46	Recycling conscience	22	Police training and turnover	33
Subcategory: the information society		Subcategory: rural and urban		Sense of security	31
Asset	Weighting	Asset	Weighting	Subcategory: culture and sports	
Basic technological training	42	Protection and sustainable development of environment	68	Asset	Weighting
Quality of access to information	36	Environmental education	32	Habit of practicing sports	37
Habit and confidence in using Internet	22			Habit of enjoying culture	37
Category: result				Institutional support	26
Asset	Weighting			Subcategory: community health	
Sustainability	---			Asset	Weighting
				Health education	43
				Promotion of health	41
				Population's health	16

Category: tourism		Category: economic activity		Category: social	
Asset	Weighting	Subcategory: agriculture, livestock and fisheries		Subcategory: employment	
Loyalty	4	Asset	Weighting	Asset	Weighting
Tourist security	2.8	Association tendency	3.67	Job security	2
Image of Gran Canaria	3.2	Institutional support	3.67	Capacity to create employment	4
Qualifications of staff	2.4	Ecological production conscience	2.5	Adequate working conditions	1.33
Category: public administration		Subcategory: industry and construction		Good labour relations	17
Asset	Weighting	Asset	Weighting	Subcategory: housing	
Efficiency	2.8	Quality	3.5	Asset	Weighting
Modernization	3.2	Modernization	3	Accessibility	2
Suitability of staff	3.2	Subcategory: trade and services		Inhabitability	3.5
Category: training and development		Asset	Weighting	Subcategory: groups under social protection	
Subcategory: primary and secondary education		Qualification and training of staff	2.33	Asset	Weighting
Asset	Weighting	Entrepreneurship	2	Quality and guarantee of protection	2.67
Schooling – regular attendance	4	Quality	2	Public support	3
Quality of teaching	2.5	Category: environment		Equality between the sexes	2.67
Absence of classroom conflicts	1.5	Subcategory: energy and water		Social volunteer conscience	3.5
Subcategory: university, science and technology		Asset	Weighting	Subcategory: population and immigration	
Asset	Weighting	Savings in energy consumption	2.33	Asset	Weighting
Teaching quality	3.67	Savings in water consumption	3.33	Absence of demographic pressure	1.33
Research quality	3.33	Diversification of energy	2	Biodemographic balance	3
Image	3.67	Subcategory: waste and recycling		Ability to absorb immigration	3
Subcategory: professional and vocational training		Asset	Weighting	Subcategory: public safety	
Asset	Weighting	Ecosystem-habitat conscience	4	Asset	Weighting
Adequacy of training programs	2.67	Non-waste-generating conscience	3	Police efficiency	4
Quality of education	3.33	Recycling conscience	4.5	Police training and turnover	3
Subcategory: the information society		Subcategory: rural and urban		Sense of security	2.67
Asset	Weighting	Asset	Weighting	Subcategory: culture and sports	
Basic technological training	2.33	Protection and sustainable development of environment	2	Asset	Weighting
Quality of access to information	2.67	Environmental education	2	Habit of practicing sports	3.33
Habit and confidence in using Internet	2.5			Habit of enjoying culture	3
Category: result				Institutional support	4
Asset	Weighting			Subcategory: community health	
Sustainability	---			Asset	Weighting
				Health education	3
				Promotion of health	2.33
				Population's health	3.67

<sup>1</sup> The evaluation of the present situation of the assets was performed using a 5-point Likert scale, where 1 represents a very bad situation and 5 very good.

Table V: Synthetic Indexes of Tenerife in relation to Gran Canaria

Sustainability	Index	Categories	Index	Subcategories	Index
Overall index	1,0286	Tourism	1.0430		1.0430
		Economic activity	1.3634	Agriculture, livestock and fisheries	1.4268
				Industry and construction	1.9630
				Commerce and services	0.8638
		Social	1.0420	Employment	1.1442
				Housing	0.9681
				Groups under social protection	1.0846
				Population and immigration	0.9458
				Public safety	1.0042
				Culture and sports	0.8918
		Environment	0.9492	Community health	1.0924
				Energy and water	0.7773
				Waste and recycling	1.0517
		Public administration	0.8014	Rural and urban environment	1.1076
					0.8014
		Training and development	0.9623	Primary and secondary education	0.9145
University, science and technology	0.9938				
Professional and occupational training	0.9554				
The information society	1.0126				

Category: tourism		Category: economic activity		Category: social	
Asset	Index	Subcategory: agriculture, livestock and fisheries		Subcategory: employment	
Asset	Index	Asset	Index	Asset	Index
Loyalty	1.0002	Association tendency	1.3400	Job security	1.0178
Tourist security	1.1622	Institutional support	0.64411	Capacity to create employment	1.4520
Image of Gran Canaria	0.9887	Ecological production conscience	2.7500	Adequate working conditions	1.1959
Qualifications of staff	1	Subcategory: industry and construction		Good labour relations	0.9537
Category: public administration		Subcategory: housing			
Asset	Index	Asset	Index	Asset	Index
Efficiency	0.9584	Quality	0.8272	Accessibility	1.2222
Modernization	0.5081	Modernization	3.9822	Inhabitability	0.4961
Suitability of staff	1	Subcategory: trade and services		Subcategory: groups under social protection	
Category: training and development		Asset	Index	Asset	Index
Subcategory: primary and secondary education		Qualification and training of staff	1	Quality and guarantee of protection	1.0225
Asset	Index	Entrepreneurship	0.6792	Public support	1.0821
Schooling – regular attendance	0.9606	Quality	0.7391	Equality between the sexes	1.4990
Quality of teaching	0.7595	Category: environment		Social volunteer conscience	0.6538
Absence of classroom conflicts	1	Subcategory: energy and water		Subcategory: population and immigration	
Subcategory: university, science and technology		Asset	Index	Asset	Index
Asset	Index	Savings in energy consumption	1.0553	Absence of demographic pressure	1.2857
Teaching quality	1.0905	Savings in water consumption	0.8116	Biodemographic balance	1.0914
Research quality	0.7023	Diversification of energy	0.6070	Ability to absorb immigration	0.2209
Image	1.0788	Subcategory: waste and recycling		Subcategory: public safety	
Subcategory: professional and vocational training		Asset	Index	Asset	Index
Asset	Index	Ecosystem-habitat conscience	1.1429	Police efficiency	1.0161
Adequacy of training programs	0.9655	Non-waste-generating conscience	1.0163	Police training and turnover	1.1937
Quality of education	1.0270	Recycling conscience	0.8897	Sense of security	0.7887
Subcategory: the information society		Subcategory: rural and urban		Subcategory: culture and sports	
Asset	Index	Asset	Index	Asset	Index
Basic technological training	1.1512	Protection and sustainable development of environment	1.1506	Habit of practicing sports	0.7239
Quality of access to information	0.8546	Environmental education	1.0163	Habit of enjoying culture	1.0093
Habit and confidence in using Internet	1.0065			Institutional support	0.9635
Category: result				Subcategory: community health	
Asset	Index			Asset	Index
Sustainability	1.0040			Health education	1.0576
				Promotion of health	1.0105
				Population's health	1.3957