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Insights on pro-environmental behavior towards post-carbon society

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Abstract

The increasing phenomena related to urbanization and human impact on landscape leads to re-think the future of the cities. As well as in buildings, a careful design, the use of renewable sources and the use of advanced technical solutions, to achieve a significant energy savings, are strategies not sufficient to define a “Post-Carbon city” or a “Post-Carbon building”. It is necessary that the citizen/occupant become a “Post-Carbon society”, i.e. they pursue conscious lifestyle marked on energy saving principles. This suggest that the occupant’s behaviour plays a fundamental role. In fact, many studies have shown that the human behaviour influences, mainly, the energy performance, explaining, in this way, the discrepancy gap between predicted and real consumptions. Since human behaviour is, in large part, influenced by several factors, a behavioural change towards sustainable lifestyle is desirable and this is possible, for examples, by providing to users feedback and information on comfort condition and energy use. The main goal of this research is to identify the pro-environmental behaviour by a questionnaire survey. Specifically, the structure of the survey will be described in this paper and the main results presented.

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1. Introduction

The city are responsible for 75% of energy consumption and for the 80% of carbon dioxide emissions that are globally produced every year [1]. This data are constantly increasing in relation to the population growth and the linked urbanization rate. An increase of about 1.2 billion people is expected in 2030, from current 7.3 billion to 8.5 billion [2]; moreover, the “urban mode” will be the geographical dominant context that will entirely absorb the population growth. In addition, every citizen aspires to achieve his/her comfort condition and this leads to an increase of both services demand, resources consumption (e.g. energy and soil) and air and noise pollution.

In this way, the city is a carrier of problems and thus new challenges to face because itself could be a victim of the climate change and, consequently, of “natural” disasters. Simultaneously, the city is the “place” in which people, goods and information concentration can lead to experiment new technologies not only in the field of production, management and use of energy, but also in other sectors such as mobility and transport, water and waste and in the building system. Then, on one hand, it is essential a correct and careful planning in which buildings and the whole cities are designed following precise rules (e.g. bioclimatic principles), where a physical infrastructure (physical capital) and an information and communication infrastructures (ICT capital) are present in order to create a connection between the technological and the sustainable city. Therefore, the city could be defined, referring to an IBM (International Business Machines Corporation) definition [3], “instrumented” (the city is digitised with the aim of gathering information) and “interconnected” (the various part of the city are connected to central system with the aim to broadcast the information) but, at the same time, must be defined “intelligent”. In other words, the city must be able to create behavioural patterns in order to allow the users to perform informed actions. Therefore, the goal is not only to arrive to a digital or technologically advanced city, but to consider the collaboration of different stakeholders. In this framework, the social capital plays a key role; more the city is liveable, more the information is favoured and more citizen will be involved and participate, favouring, consequently, the development and the growth of the city.

The behavioural change could lead to an energy saving between 5% and 20% [4, 5] only if a sharing of simple, immediate and easy to be interpreted information is possible, highlighting the close relationship between technology and users in order to let everyone be aware of appropriate mechanisms to reduce consumption. The user becomes a key player, active and dynamic, that will make the right decision not only in the building itself but in connected buildings (i.e. in the Smart Grid). A correct interpretation of ICT data and insights on the human *psyche* would help to achieve the awareness of sustainable behaviour. According to the Theory of Planned Behaviour (TPB) [6], human behaviour is a function of several aspects: attitude (as the user stands in relation to other objects or people), moral or social norms (set of shared rules that do not have the force of law, remembering that man, unconsciously, let himself be influenced by the opinion of others) and the behavioural perception (the idea that some factors may facilitate or hinder the achievement of a specific behaviour).

The main goal of this paper is then to explore behaviours, attitudes and building characteristics (related to energy consumption) of a random group of people through the elaboration and the administration of an online questionnaire aiming at highlighting the factors leading to a pro-environmental behaviour.

2. The pro-environmental behaviour

Some important issues as global warming, urban air pollution, water scarcity, environmental noise or loss of biodiversity are emerged in recent years, as a result of human activities. Although the man has changed the environment in which he lives, this does not necessarily mean that his actions were and are facing a conscious and intentional of ecosystem destruction, but rather to a research of comfort, safety and fun. Therefore, it is necessary to investigate what are the most common behaviours related to energy saving/consumption.

The occupant behaviour is not based on objective and unambiguous principles, but it is unpredictable. For this reason, this issue is still a subject of several studies with the purpose of understanding, as much as possible, the actions and reactions between man and other objects, organisms or environment, reminding that the behaviour is a manifestation of the interaction between a number of factors, which lead the individual towards different ecological, economic and social choices. Specifically, the environmental behaviour is the relationship between individuals, their

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