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Sustainable business models for deep energy retrofitting of buildings: state-of-the-art and methodological approach

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Abstract

The achievement of the sustainability goals within the building sector involves the adoption of sustainable business models (SBMs) and energy efficiency measures. On one side, traditional business models (BMs), aiming to express the business logic of firms, need to incorporate the triple bottom line, by embracing the economic, environmental and social dimensions. On the other side, the implementation of energy efficiency measures might occur through deep energy retrofits on buildings, considering their significant contribution to the decrease of greenhouse gas emissions and energy use. The measures of energy refurbishment are not only useful in reducing environmental impacts and saving building owners' money, but might also represent a powerful source of business for other stakeholders, e.g., retrofitting service providers. This paper first illustrates the state-of-the-art of BMs for energy efficient retrofitting actions within the building field. Therefore, common BMs in this scope are described and compared in their main components, with an analysis of potentials and limitations. This leads to the identification of research gaps, with the formulation of a set of questions that need further examination. Afterwards, the paper presents a methodological approach regarding a possible way to incorporate quantitative sustainability analyses into BMs related to projects of energy efficient refurbishment in buildings. The aim is to provide the basis for empirical testing on case studies, with further development of the proposed methodology. Lastly, there is a critical discussion on how the presented methodological approach could fill the research gaps, with the indication of possible future research directions.

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1. Introduction

The oil crisis of the 1970s made the western world conscious of the limitations and exhaustibility of natural resources, pointing out the fundamental concept of the Sustainable Development [1]. The term development was meant as a continuous process that implies the integration of three crucial and related spheres, namely: environment, economy, and society [2]. Accordingly, around the world, laws and policies started to incentivize the use of innovative products and processes, encouraging the achievement of the sustainability goals towards an increasing awareness of both environment and resource limits [3,4].

At corporate level, the need for sustainable business rapidly emerged, leading to approaches that deal with social, environmental, and economic issues in a holistic way. The main aim was to contribute to the changes in organizations so that they can actively concur to the sustainable development goals [5]. Therefore, in the last two decades, the business model (BM) concept was object of a growing attention within the research world and several interpretations are available in the literature [6,7]. For example, a conventional definition of BM was proposed by Osterwalder et al. through the BM “ontology”, later referred to as “canvas” (Fig. 1) [8,9]. Specifically, BMs were described as conceptual tools containing a set of objects, theories, and their relationships, showing the business rationale of specific firms to produce, supply, and catch profit. Particularly, Osterwalder et al. identified nine main blocks to describe BMs, i.e.: 1) customers, 2) value proposition, 3) channels, 4) customer relationships, 5) revenues, 6) key resources, 7) key activities, 8) key partners, and 9) costs. Furthermore, three main elements were identified in the BM conception: (i) the value proposition, related to the product/service offered to the customers; (ii) the value creation, concerning how firms connect to suppliers and customers; and (iii) the value capture, regarding how different actors obtain economic benefits [10].

The BM concept is relevant in the sustainability context since it is connected to the effects of existing corporate organizations on the sustainable development targets. The implementation of sustainable BMs (SBMs) could, in fact, drive the integration of sustainability issues into business goals and processes, contributing as a cardinal factor of competitive profit [11].

Nonetheless, the examination of the notion of SBM is rather recent [12]. The SBM framework is based on the traditional BM, where the proposition, creation, and capture of value occur while preserving the environmental, social, and economic capital, beyond the managerial borders. In particular, unlike the market and customer-oriented approach of BMs, SBMs involve a broader domain including all the stakeholders and the natural ecosystem [13].

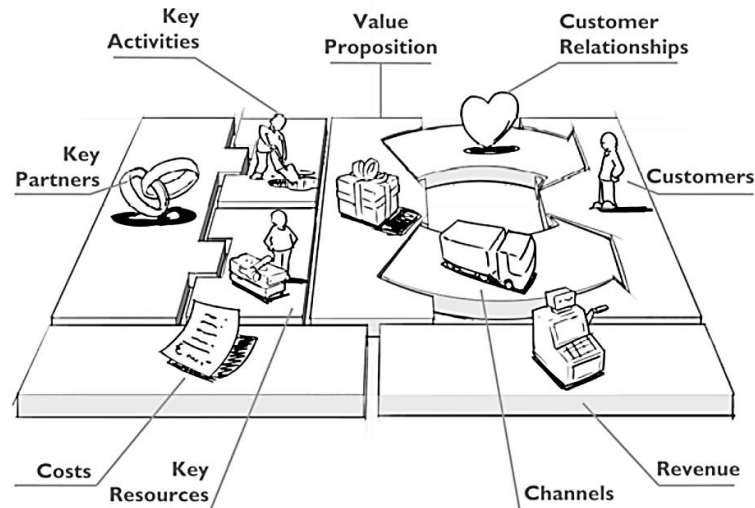


Fig. 1. General business model canvas by Osterwalder et al. [9].

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