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BUILDING INTEGRATED PHOTOVOLTAICS: BARRIERS AND DRIVERS IN THE UNITED ARAB EMIRATES

by

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Abstract

Certain innovations in the architecture discipline have the unique potential to reduce the negative environmental impact of buildings. Globally, 40% of total annual energy produced is consumed by buildings; however, this value is almost 80% in the United Arab Emirates (UAE) due to climatic and other reasons. From an architectural perspective, this study focuses on Building Integrated Photovoltaics (BIPV) as an innovative technology which provides decentralized solar energy and the generation of clean renewable energy. Existing literature suggests that the adoption of this technology is, however, limited. In 2016, after almost 30 years of invention, it contributed less than 1% to the global energy mix. In the UAE, local and international building rating systems urge architects and other industry stakeholders, to apply innovations such as BIPV. However, there is a lack of current data on BIPV perception and few examples have been built; consequently, large scale adoption remains unachieved. This dissertation explores the current scenario, identifies context-specific barriers, and drivers, as well as possible connections which can guide practical recommendations for national and global diffusion. Using the design process and the BIPV value chain to create a list of stakeholders, a two phase-study with architects, researchers, engineers, developers, PV specialists, policy makers and potential clients was conducted. Phase 1 involved eighteen preliminary, informal conversational interviews which led to the development, pilot, and execution of a semi-structured interview protocol in Phase 2. This second and main phase, involved sixty-eight interviews with stakeholders across the UAE. The thematic analysis of the data collected revealed that there are seven barrier, and five driver themes that impact BIPV diffusion in the UAE, which potentially exist in other similar contexts. The barrier themes include environmental, design, knowledge, economic, social, policy, and industrial issues, while driver themes include, government, knowledge, design, and the economic dimension. Further scrutiny of the findings revealed varying levels of emphasis, as well as a range of multi-level and complex connections. This contribution to knowledge was enhanced by the development of a pathway to the adoption of innovative technologies in the UAE and beyond. Recommendations for further research and suggestions for planning are also presented.

Keywords: Building Integrated Photovoltaics, Innovation, Thematic Analysis, Barriers, Drivers, UAE