بسم الله الرحمن الرحيم

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شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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التوثيق الإلكتروني والميكروفيلم

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A PARADIGM SHIFT: GENERATION OF OPEN INNOVATION FRAMEWORK FOR BUILDING INDUSTRY

By

Tarek Yehia Kattaria

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
Requirements for the Degree of
DOCTOR OF PHILOSOPHY
In
ARCHITECTURAL ENGINEERING

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
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Title of Thesis:
A Paradigm Shift: Generation of Open Innovation Framework for Building Industry

Key Words:
Building Industry - Collaboration - Open Innovation - Paradigm shift - Innovation Framework.

Summary:
The building industry has been recognized for its lack of innovation. Currently, a newly innovative paradigm introduced to enhance innovation, is mainly working on collaboration named by "Open Innovation". It is declared that building industry field is not pioneer in open innovation although literatures and critical reviews on the state of art innovative framework in building industry concludes that collaboration is the main factor that improves innovation performance. Accordingly, that thesis aims to draw an open innovation collaborative framework rather than the state of art, therefor the thesis illustrates the sufficient building industry collaboration projects and activities globally and contextually introducing their factors, inputs and driving forces toward innovation. After additionally, a contextual questionnaire is then constructed in order to test the proposed open innovation framework towards the Egyptian professional innovation context, the outcomes worked as guidelines to draw the Egyptian open innovation building industry framework. Findings highlight that the Egyptian market has a high demand for collaboration in general but not with public and governments. There is a high demand for multinational collaborations. There are several barriers such as financial issue, social skills. There is need for R&D otherwise sharing knowledge with supply chain and applying BIM is a major demand.

Disclaimer

I hereby declare that this thesis is my own original work and that no part of it has been submitted for a degree qualification at any other university or institute.
I further declare that I have appropriately acknowledged all sources used and have cited them in the references section.

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ABSTRACT

The building industry is globally recognized for its lack of innovation. Either in EU, with an overall innovation and R/D expenditure performance, or locally in Egypt where there is a complete absence of R/D. Accordingly in order to cope with the building industry market and to develop new technologies and process, innovation is always and become a key focus of different fields' development. In the process of searching for innovative ways to enhance competitiveness, many other fields start to adapt a new paradigm, a shift in innovation named by "open innovation" an innovative collaboration paradigm. While building industry innovation state of the art literatures focus mainly on an innovation framework that is developed from closed ordinary innovation practice and critical reviews does not consider the collaboration of open innovation paradigm yet. Critical reviews conclude that innovative collaborative is a critical factor to improve innovation performance in building industry. A quantitative survey by the Stichting Innovative & Arbeid reveals that the building industry sector is not a pioneer in the area of open innovation. Therefor the thesis aims to develop both a global open innovation framework generation antecedents and a contextual open innovation framework in the Egyptian context.

Firstly, the thesis investigates the state of art innovative framework antecedents (factors/inputs/drivers), through a selection of successful innovative collaborative projects, organizations and systems innovations in order to develop them to a more open collaborative state of art antecedents then deduct/add/modify, following a design science method to synthesis the outputs in order to draw the new open generation framework, the thesis also aims to develop it in order to promote this open innovation framework in the Egyptian building industry contextual field. Therefore the thesis investigates the innovative collaboration "open innovation" practice and literatures in the Egyptian building industry field in order to find the limitations and guidelines to test the global proposed framework on contextual case study participants through a conducted survey formed of a questionnaire on the innovation team at Daar El-Memaar Group. The thesis findings indicates that the proposed global collaborative innovation framework main factors mostly depends on R/D, 3D printing and international external collaboration while main input is public collaboration while BIM is considered a main technological collaborative driving forces tool for building innovation. While the contextual survey findings highlighted that the Egyptian building market has high demand for collaboration but not with governments or clients but more with users, public, research institutes and material manufacturers. Funding on mobile collaborative applications is proper for surveys, according to R/D is in a need for material and time management, sharing knowledge with supply chain and client are main inputs through an open portals, innovative platforms and crowdsourcing while BIM is major driver, while

demanding for innovative collaborative spaces is not common yet in addition to technological and time acceleration collaborative spaces is not common yet in addition to technological and time acceleration, durability, productivity and other pressures drive that context like economical which is a main driver than environmental and time acceleration.

Although novel materials, new business models and new design and build trends are emerging, yet tangible results of successful innovative works remain hidden inside projects. These results fail to translate to other projects and diffuse within their processes. Currently, many enterprises from different industries face increasing levels of competition. In the process of searching for ways to enhance competitiveness, many enterprises start to adapt a new paradigm shift in innovation named by “Open Innovation”. Literature in this area focuses on the building industry innovation framework mainly but does not develop an open framework yet. Critical reviews conclude that collaboration is a crucial factor to improve innovation performance in building industry. This thesis looks to develop those innovation framework antecedents following a design science method. This is to synthesize it with the open innovation antecedents and innovative collaborative activities in the building sector. The paper also aims to develop guidelines on how to promote this open innovation framework in the Egyptian building industry contextual field.