6-1-2023

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Abstract

This paper explores a theoretical framework, the antecedent factors that shape it, and a practical interactive study for formalizing industry-university collaborations in the field of lighting. The framework uses an identity paradigm – an educational identity for the lighting industry and an entrepreneurial identity for universities. It further argues that such an identity exchange provides better avenues to address the performance of industry-university collaborations. These collaborations are viewed as learning interactions and decisions based on knowledge transfer between individuals from the lighting industry and universities. The proposed interactive study using survey research will be designed to enable participating individuals from the lighting industry and universities to heuristically evaluate the knowledge transfer required for establishing and maintaining successful industry-university collaborations. Responses are invited from interested individuals in the lighting industry and universities for developing a set of conditional propositions to improve the performance of such collaborations.

1.0 Introduction

Lighting industry-university collaborations may range from informal mechanisms such as publication of research results, employee mobility, or casual exchanges between researchers to more formal contractual mechanisms for establishing long-term relationships. A review of existing literature on industry-university collaborations reveals that such collaborations can be one of the most successful knowledge transfer mechanisms between the lighting industry and universities (Zyl and others 2007). Nezu and others (2005) reinforce this by demonstrating that universities as independent entities are not always aware of how best to mobilize their academic knowledge; while the industry can utilize the most advanced knowledge speedily developed by universities rather than doing all of their research on their own. Despite this being the case, little published work has been found that evaluates the performance of lighting industry-university collaborations in terms of knowledge transfer. Bekkers and Freitas (2011) argue that this may be related to the differences in evaluation criteria, which are dependent upon the parties involved in the collaboration. University-driven projects allow for unexpected fruitful scientific and technological developments with high spillovers to other fields. They tend to focus on the creation and dissemination of knowledge by publishing academic papers in leading scientific journals rather than transferring it to the private sector or applying for patent protection. Industry-driven projects on the other hand are more likely to benefit only participating companies, as they tend to focus on the development and commercialization of new products using the same knowledge.

A study (Radas 2005) provides evidence that existence of highly educated employees in companies can be crucial for establishment of a more intensive collaboration with universities. Such companies possess their own development

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Manuscript received: 04-03-2023

Revision accepted: 28-03-2023

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capabilities, in the form of individuals who are able to communicate with university researchers and a desire for independent research.

Dugar and Wilkerson (2013) have proposed a paradigm framework for planning the various phases of lighting industry-university collaboration that provides new avenues for evaluation in terms of identity exchange through knowledge transfer. They argue that the lighting industry has an inherent educational identity as it simultaneously creates new knowledge while developing new solutions: its overall mission of developing cutting-edge solutions cannot be achieved without questioning current knowledge. They further argue that the university has an inherent entrepreneurial identity as it is run as a business: its overall mission of creating and disseminating knowledge cannot be achieved without operating like a business. -The interactive study has been designed to broadly evaluate knowledge transfer in terms of knowledge advances, level of knowledge absorption, commercialization of new products, and subjective inputs from the collaborators. It attempts to address performance in lighting industry-university collaboration by examining the performance of actual collaborations from a sample of collaborative projects, and the views of individuals on collaboration from a sample of potential collaborators. The focus is on motivation for collaboration, collaboration intensity and satisfaction with collaboration. As collaboration is aimed at enhancing innovation capabilities of companies, research has been focused on how collaboration affects selected innovation indicators.

2.0 Method

The overall research strategy comprises of empirical tests, heuristic evaluations and interviews, where potential collaborators can evaluate the knowledge transfer in existing collaborative projects and formulate their most desirable projects. From a literature review of the most effective industry-university collaborations, a set of performance indicators based on knowledge transfer is derived (Kaymaz and Eryiğit 2011; Pertuzé and others 2010; Prigge and Torraco 2006). These indicators measure performance in terms of (a) the level of scientific and technological achievements, (b) the degree to which lighting companies make use of the knowledge that was developed, and (c) the subjective evaluation of the success of collaboration by both parties involved depending upon: (i) the different levels of involvement of the lighting industry and universities in the different phases of collaboration, (ii) the specific forms of implementation of projects, (iii) the previous collaborative experiences of both parties, and (iv) the characteristics of the individual researchers and their respective working environments (Bekkers and Freitas 2011). A theoretical framework for planning the various phases of lighting industry-university collaboration with knowledge transfer evaluation at every phase is then derived using these indicators.

An interactive study will be been designed, where a purposefully selected sample of participants from the lighting industry and universities can be presented with a set of questions pertaining to the framework and examples of industry-university collaborative projects. The idea is to systematically engage participants in the collaboration process while enabling them to state their opinions about these project examples, as well as needs, hopes and aspirations about their most desirable projects. Research shows that individuals generally learn more and remember better when they think about new material, figure out solutions, and apply new knowledge to their own lives and needs (Barron and Darling-Hammond 2008). A quantitative and qualitative analysis of the responses obtained from this study will be done using nonparametric tests and grounded theory coding respectively, so as to arrive at the most desirable propositions for such collaborations.

3.0 The Identity Paradigm Framework

The cognitive learning through the type of knowledge being transferred between individuals whether explicit or tacit, and the context of such interactions whether physical or social, is used as

a basis for developing the framework (Sherwood and others 2004). Explicit knowledge is knowledge that can be articulated verbally or in writing such as written specifications, documentation, etc. Tacit knowledge is knowledge that cannot be articulated verbally such as skills related to the application of knowledge, know-how related to adapting such knowledge, etc. The physical context includes integrative mechanisms such as emails, face-to-face meetings, group work, amongst others, for effective communication, while the social context includes relationships and trust building through these mechanisms.

3.1 Knowledge-based Performance Indicators

Nezu and others (2005) argue that the most reliable indicator of industry-university collaborations is the number of academic papers cited in the patent applications filed to the patent and trademark office. They further argue that university spin-offs are the best and ensured way of commercializing the results of university-conducted research particularly in the case of disruptive or very innovative technologies. Spin-offs are an entrepreneurial and risk-taking yet most efficient method of exploiting knowledge developed by universities for commercial benefit in comparison to licensing existing firms. The effectiveness of this method is particularly noticeable in sectors where a new discovery is often directly usable without having to go through the many stages from basic research to commercial application. The types of spin-offs can include: (i) firms founded by university researchers such as staff and students, (ii) start-ups with licensed technologies, and (iii) firms in which universities have an equity investment. Based on the above-mentioned factors, the performance of potential collaborators will be measured in terms of these independent variables: the number of authored or coauthored papers (Npaper); the number of patents in which they are listed as inventors (Npatent); and whether they have established any spin-off (Spin) or start-up (Startup) companies.

4.0 Future Steps

A more comprehensive strategy for an interactive study involving interested industry and university participants will be required for taking this study further.

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