

Exploring the Success of R&D BIOTECH Innovators in Higher Education Institutions: A Case Study of UPLB Agricultural Innovation

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Abstract

This study investigated why and how R&D BIOTECH innovators in higher education institutions achieve success. It used a qualitative method employing a single case study research design. The data were obtained from face-to-face, one-on-one, and open-ended interviews among scientists-innovators in UPLB Biotechnology. Descriptive analysis was engaged using coding and content analysis which involved tagging the text to other qualitative data using a system of categories. Based on the results, external Environmental Aspects and External Relations drivers were determined to have unique characteristics related to the R&D BIOTECH agricultural sector influence innovation. Further, findings showed a unique competency pattern and specific attributes that enable successful R&D BIOTECH innovation in higher education institutions. Finally, the knowledge-sharing process significantly contributes to a successful innovation product that the end-users can utilize – farmers and the society at large – bringing social justice.

Keywords: *Circular Economy, Core Competencies, Creativity, Higher Education Institution, Innovation Competencies, Innovators-Scientists, Knowledge, Knowledge Sharing, Product Innovation*

Introduction

The world in which we live has changed drastically as this research progressed. Challenged by the complex environment, aggravated by a pandemic, an economic downfall, and continuing and perhaps even increasing environmental challenges, there is a demand for sustainable technologies to mitigate natural calamities. Essentially, we need to choose technologies that will restore the natural vastness of the planet earth.

Driven by the need, agriculture is an area in rapid development – both technological development and the development of alternative production systems (Hansen et al., 2001). However, with the admission of economic industrialization accompanying its irresistible benefits and challenges, the agriculture-based economy of the Philippines has been left behind, unable to enhance its agricultural richness (Brown et al., 2018). In addition, Asian countries, including the Philippines, are experiencing an economic transformation—rapid growth, urbanization, and related technical and social changes (Khan et al., 2019)—and cannot escape the adversities natural disasters bring.

Industries are increasingly innovatively responding to social and environmental claims from society (Briseno & Zorrilla, 2017), including Biotechnology in higher education institutions (HEIs). A significant driving force behind this innovation activity is the conditions of the environment (Capon et al., 1992). Therefore, innovation practices are encouraged to attend to poverty, work equality, renewable energy, and food production, notwithstanding the hazardous effects of climate change and the necessity of frequent repetitive implementation to address impacts on sustainability.

Further, higher education institutions and other organizations must produce novel products to satisfy client needs and keep up with the current contexts to remain relevant. Therefore, the constant development of new products, which most scholars call product innovation, is viewed as a gigantic indicator and leap in an organization's success and enduring growth (Shimp, 2000).

The study supports the idea of a circular economy in a global context. The intent is to make better use of resources by fully convalescing materials instead of wasting them and design better technologies to protect the environment and use natural resources more wisely (UNCTAD).

Results and findings

Following a short section providing context with demographic information on the research participants, the findings are discussed in terms of three areas:

1. Characteristics of BIOTECH that Influence Innovation
2. Knowledge Sharing
3. Why and How R&D BIOTECH Innovators in Higher Education Institutes Achieve Success

1. Characteristics of BIOTECH that Influence Innovation

The findings show that external drivers in the areas of Environmental Aspects and External Relations – having unique characteristics related to R&D BIOTECH agricultural sector – have a strong influence on innovation, even referred to as “fueling” successful innovation.

Table 1. Characteristics of BIOTECH that Influence Innovation

Category	Sub-category	Themes	Verbal Description	F N=8
External drivers	Environmental Aspects	Natural Calamities	Refers to environmental problems which serve as the impetus for producing technology.	8
		Societal issues	Refers to the issues that hamper agricultural growth in attaining economic growth, achieving sustainable development, and mitigating climate change.	7
	External Relations	State of the Art Facilities	Refers to the location of technology development. There are two kinds of facilities: (1) On-site (laboratory) for the storage of specimens such as fungi and bacteria; (2) Off-site (field) where root crops, grains, or fruit-bearing trees are grown.	6
		Funding Agencies	Refers to interested parties who wish to finance the development of technology.	6

The university supports the innovators' passions by developing a Technology Transfer and Business Development Office (TTBDO), which supports the innovator working with end-users and acting as a gatekeeper for emerging issues outside the purview of the innovators' focus. This support is demonstrated in developing state-of-the-art facilities (on-site and off-site) and in the TTBDO's leading role in interacting with funding agencies to seek funding necessary to support BIOTECH's aggressive pursuit of solutions to natural calamities and societal issues.

2. Knowledge Sharing

Recently, BIOTECH has introduced product innovations to meet industry, community, and national policy needs but still needs to discuss the knowledge-sharing flow that influences innovation. *Knowledge sharing* is "team members sharing task-relevant ideas, information, and suggestions" (Srivastava et al., 2006), p. [4]. In this context, the forefather transfers knowledge sharing, which means acquiring knowledge through competent individuals for one purpose (Minciullo & Pedrini, 2015) to produce product innovation (Thorisson & Talbot, 2018). The knowledge-sharing process refers to the nature of knowledge and the stages of how knowledge is shared from one actor to another.

Whether you consider knowledge as "justified true belief" or "the capacity to take effective action" (Bennet et al., 2018), tying knowledge to action allows the identification of the quality (or effectiveness) of the knowledge, which is dependent on how well a specific action achieves its anticipated outcome.

Increasingly, it is crucial to understand what farmers understand and how their knowledge practices incorporate others – especially given the emerging call for environmentally-oriented policy measures to move beyond the individual farmer focus (Thomas et al., 2020). This research considers how innovators engage with, utilize, and share knowledge with the end-users, including farmers.

Figure 1 refers to the positive recognition and reinforcement received when sharing and expanding knowledge from the gurus to the innovators and research assistants. Such a process sustains the legacy of passing technology from generation to generation.

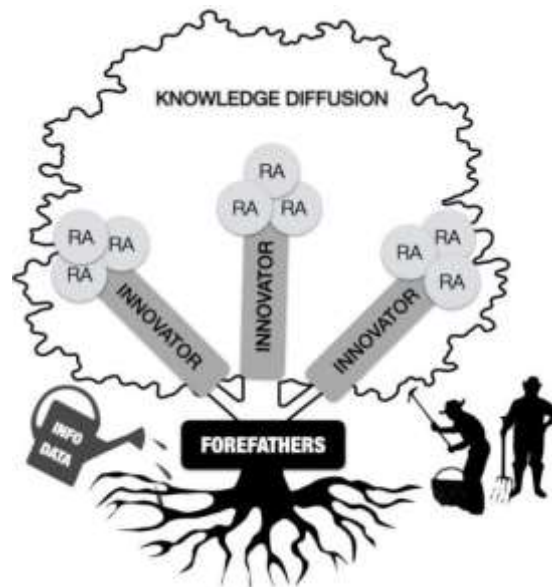


Figure 1. The diagram of knowledge diffusion

3. Why and how R&D BIOTECH innovators in higher education institutes achieve success.

There are three steps in the formal innovation process used in UPLB BIOTECH involved in the development of successful innovation as shown in Fig. 2: (1) The intertwining of knowledge, creation, and innovation tightened knowledge absorption; (2) The firming-up of the innovation product along with the available set of emerging influencers; and (3) The way forward to the utilization of the innovation produced by the beneficiaries. See Figure 2. This process provides the context from which the answers to our research questions emerged. In addition, details and examples – beyond the four contexts of this paper – emerged throughout the study, supporting the effectiveness of this foundational approach to innovation.

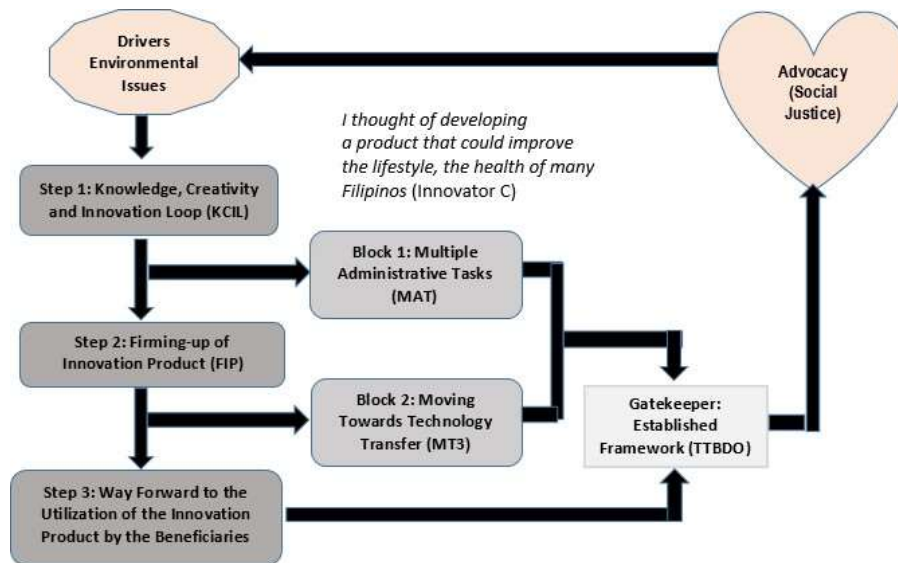


Figure 2. Three Steps or Processes Involved in the Development of the Technology

Limitations

A shortcoming of this research is its specific focus on one BIOTECH group in one culture. It is worthwhile to explore the Innovation Model in terms of other domains of knowledge and, indeed, in terms of other cultures. However, there is a greater need to focus on technologies to support food security and safety in our volatile environment. The factors that surfaced in this study affect innovation. There would be value in exploring those connections more deeply in future research.

Recommendations

Below are the recommendations of the study:

- Have an Open University research expertise so industries can optimize the robust research outputs in academe.
- Higher Education Institutions (HEIs) may initiate collaborative research and development agendas to enhance the tripartite relationship between universities, industry, and the government in producing worthwhile technologies.
- There was a strong appeal even made by the Intellectual Property Office, Philippines (IPOPh), for all universities to have a stable Intellectual Training Service Office (ITSO) for the technologies to be protected.
- Moreover, finally, to produce on time the technologies for the target end-users, strengthening and streamlining the existing financing mechanisms of the government is requested.

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