



Indian Farmer

Volume 9, Issue 06, 2022, Pp. 208-212.

Available online at: www.indianfarmer.net

ISSN: 2394-1227 (Online)

ORIGINAL PAPER

Role of Research and Development in New Technology Development

Shailesh Kumar Meena* and Poornima

Dairy Technology Division, ICAR-National Dairy Research Institute, Karnal

* Corresponding author: shaileshmeena53@gmail.com

Article Received: 27 May 2022

Published Date: 02 June 2022

INTRODUCTION

Technology development is an investigation undertaken to acquire new knowledge, though directed primarily towards a specific objective or practical aim – developing ideas into operational form. The term “technology development” refers to a special class of development projects where the deliverable is new technology, new knowledge, a technical capability, or a technological platform. Technology development projects are a unique breed: despite accounting for a small percentage of a normal company's development effort, they are critical to the company's long-term growth, success, and, in certain cases, survival.

Technology management can be defined as “an interdisciplinary field that integrates natural science, engineering, and practices and management knowledge”. A classic definition from the National Research Council is: “An interdisciplinary field concerned with the development, planning, and implementation of technological capabilities to shape and accomplish the operational and strategic objectives of an organization”

Technology development knowledge building Model

The technology development knowledge building model focuses on the nature of discovery, or the search for new knowledge and it is a process of discovery or exploratory research for acquiring knowledge. The concepts of cycle time management can provide a framework and protocol for managing technology development. In order to achieve value alignment with the company, effective monitoring necessitates a plan for assessing progress in such learning intensive, discovery-oriented research.

Quick walk through the typical technology development process

The discovery or idea generation stage is the initial stage of the technological process. A successful technology programme requires quality ideas, hence technology ideas from a variety of sources must be sought for consideration at Gate 1. While idea generation is often done by scientists or technical people, it can also be the result of other activities, such as:

- a) A strategic planning exercise, where strategic arenas are identified, and possible technology development research directions are mapped.
- b) Technology forecasting and technology road mapping.
- c) Brainstorming or group creativity sessions focusing on what might be.
- d) Scenario generation about future market and technological possibilities.
- e) Customer visitation programs and voice-of-customer initiatives.
- f) Active idea solicitation campaigns within the organization

Gate 1: Idea Screening

The first gate is the idea screen, the initial decision to commit a limited amount of time and money to the research project. This gate should be a gentle screen, which poses the question: Does the idea merit expending any effort at all? Criteria for Go are largely qualitative, are scored at the gate review by the gatekeepers, and should include such items as:

- a) Strategic fit and impact.
- b) Strategic leverage.
- c) Likelihood of technical success.
- d) Likelihood of commercial success.
- e) Reward or the “size of the prize” if successful.

The Gate 1 gatekeeper or decision-making group is typically composed of senior R&D people, such as the corporate head of technology (VP R&D or CTO), other senior R&D people, along with representatives from corporate marketing and business development to ensure commercial input.

Stage 1: Project Scoping

The purpose of this Scoping stage is to build the foundation for the research project, define the scope of the project, and map the forward plan. The effort is limited, typically to not much more than two weeks. Stage 1 activities are conceptual and preparation work, and include a technical literature search, patent and IP search, competitive alternatives assessment, resource gaps identification, and a preliminary technical assessment.

Gate 2: Go To Technical Assessment

This second screen is the decision to begin limited experimental or technical work in Stage 2. Like Gate 1, this gate is also a relatively gentle screen, and poses the question: Does the idea merit undertaking limited experimental work? Gate 2 is again largely qualitative, and does not require financial analysis (because the resulting

product, process or impact of technology development are still largely unknown). The gatekeepers are the same as at Gate 1.

Stage 2: Technical Assessment

The purpose of Stage 2 is to demonstrate the technical or laboratory feasibility of the idea under ideal conditions. This stage entails initial or preliminary experimental work, but should not take more than 1–2 person-months, and last no longer than 3–4 months. Activities here typically include undertaking a thorough conceptual technological analysis, executing feasibility experiments, developing a partnership network, identifying resource needs and solutions to resource gaps, and assessing the potential impact of the technology on the company.

Gate 3: Go to Detailed Technical Investigation

Gate 3 is the decision to deploy resources beyond 1–2 person months, and opens the door to a more extensive and expensive investigation, Stage 3. This gate decision is thus a more rigorous evaluation than at Gate 2, and is based on new information from Stage 2. The Gate 3 gatekeepers usually include the corporate head of technology (VPR&D or CTO), other senior technology or R&D people, corporate marketing or business development, and the heads of the involved businesses (e.g., general managers). Because Gate 3 is a heavy commitment gate, senior managers of the business units that will take ownership of the resulting technology should be the Gate 3 gatekeepers. Their insights into the commercial viability of the project are essential at Gate 3; further, more early engagement ensures a smoother transition to the business unit once the commercial phase of the project gets underway.

Stage 3: Detailed Investigation

The purpose of Stage 3 is to implement the full experimental plan, to prove technological feasibility, and to define the scope of the technology and its value to the company. This stage could entail significant expenditures, potentially person-years of work. Besides the extensive technical work, other activities focus on defining commercial product or process possibilities, undertaking market, manufacturing and impact assessments on these possibilities, and preparing an implementation business case. Sound project management methods are employed during this lengthy stage, including periodic milestone checks and project reviews. If the technology development project veers significantly off course, or encounters serious barriers to completion during Stage 3, the project is red-flagged and cycled back to Gate 3 for another Go/Kill decision.

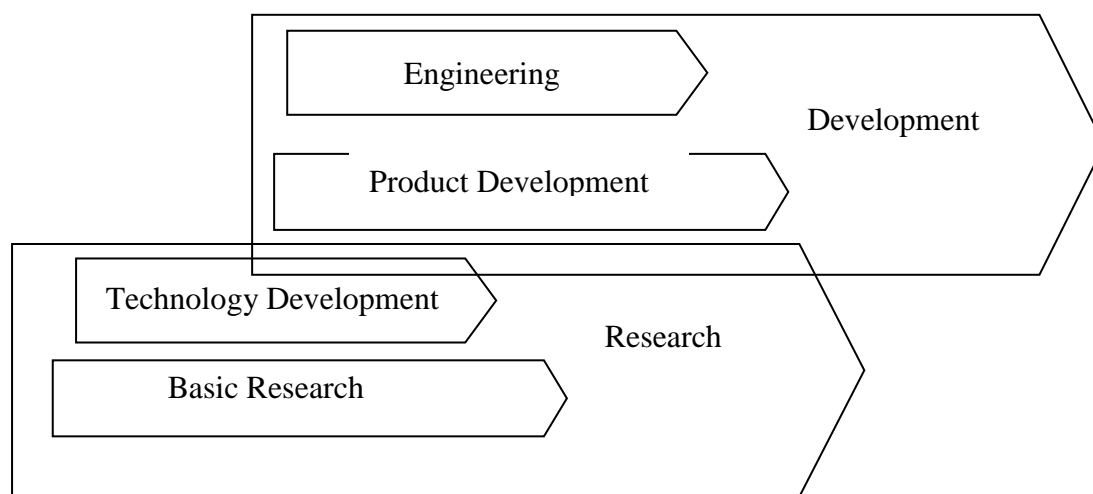
Gate 4: The Applications Path Gate

This is the final gate in the technology development process and is the “door opener” to one or more new-product or process development projects. Here the results of technical work are reviewed to determine the applicability, scope and value of the technology to the company, and the next steps are decided. Note that this Gate 4 is often combined with an early gate in the usual product development process (for example, with Gate 1, 2 or 3). Gatekeepers are typically the senior corporate R&D people,

corporate marketing or business development, plus the leadership team from the relevant business that will assume ownership of the resulting commercial development projects.

Technology development and product development

Technology development and product development are two deeply interrelated activities, although with some fundamental differences. There are several dimensions where technology development differs from product development in terms of task characteristics – namely prerequisites, technical maturity, time horizon, competence needs, process repeatability, and completion point. Technology development is more problem- and concept-centric, while product development pursues solutions and needs on a more detailed level.



CONCLUSION

The development of technology knowledge focuses on the nature of discovery, or the search for new knowledge and it is a process of discovery or exploratory research for acquiring knowledge. The concepts of management can provide a framework and protocol for managing technology development process. For the develop of a successful technology, several qualitative thoughts and ideas, several trials, and hence technological ideas from a variety of sources, discussion of problem etc. are required. It is necessary to go in depth research and learn for resolve the problem occurred for development of a technology.

REFERENCES

- Aristodemou, L., Tietze, F., O'Leary, E., and Shaw, M. (2019). A literature review on technology development process (TDP) models. doi:10.17863/CAM.35692
- Cooper, R. G. (2006). Managing technology development projects. *Research-Technology Management*, 49(6), 23-31.

- Cooper, R. G. (2007). Managing technology development projects. *IEEE engineering management review*, 35(1), 67-76.
- Sheasley, W. D. (1999). Leading the technology development process. *Research-Technology Management*, 42(3), 49-55.
- Sheasley, W. D. (2000). Taking an options approach to new technology development. *Research-Technology Management*, 43(6), 37-43.
- Talonen, T., and Hakkarainen, K. (2008). Strategies for driving R&D and technology development. *Research-Technology Management*, 51(5), 54-60.