Developing Value through Synergistic Collaboration

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In order to determine the most efficient way to manage process development activities, many factors must be addressed well in advance of the piloting stage (opportunity cost and prioritization, capabilities and expertise, capital expenditure limitations, confidentiality, corporate constraints, etc). Understanding the relationships between all of the tangible and intangible issues is key to making an appropriate spending decision. This paper will discuss a typical decision tree tool and its shortcomings, will examine the precise questions to ask in order to determine which path to take, and will describe a novel conceptualization of chemical product development.

Over the past 15 years manufacturers in a variety of industries have been refining new product development (NPD) processes to reduce lead times and risk. Models such as test kitchens and "skunk works" have been studied for developing a comprehensive theory of product development that integrates a variety of disciplines into teams. Many of the methods include the use of rapid prototyping, process innovation and team-based, multidisciplinary approaches. Applying the knowledge acquired from research into principles and methods of industrial development, we shall describe for you what we call the "Test Kitchen Method" (TKM) for reducing cost, lead time and risk in chemical product development.

From Concept To Commercialization

While the typical decision tree, commonly employed in a structured organization, assumes that both the innovative product and the manufacturing process are well defined, the "Test Kitchen Methodology" (TKM) posits that product and process innovation rarely occur in highly structured environments where traditional sequenced "gating" development is used. Gating is the process of dividing the product development process into domain specific stages, where passage from one stage to another occurs only after certain criteria are met. This model has evolved and become pervasive because of the need for successive accountability in traditional corporate environments. Using this model, there tends to be little interaction among the domains. Because efficiency is regarded as a positive value in most corporate settings, sequenced gating often compromises innovative outcomes for management ease.

TKM uses multidisciplinary teams to develop early stage product prototypes utilizing a variety of processes and formulations for preliminary testing. It is a "Ready. Fire. Aim." method rather than the traditional, "Ready. Aim. Fire." Because of the nature of rapid prototyping, there are many opportunities for spontaneous invention and serendipity, the leading catalysts for innovative successive iteration. Despite the benefits, the less structured and predicable nature of the process has created the need for a specialized new kind of NPD management that often is conducted outside of the corporate management infrastructure. Specialized TKM facilities are often needed to ensure a level of responsiveness, flexibility and confidentiality in process development and pilot production methods.

The first step in product development is to identify all unknowns and uncertainties for a desired chemical product or process. This is critical, as many companies regard early failure as embarrassing and employees find it beneficial to play these down in order to "will" success. Underestimation of the uncertainties in a proposed chemical process is the single largest barrier to successful new product

development. This evaluation is crucial in order to identify risk and cost issues and it is best accomplished by a small, focused team of engineers, chemists, consultants and others that is not competing with the company or designated management but that can operate outside of typical corporate policy constraints and has the authority to make decisions regarding scope and direction.

Experimentation, communication and documentation are important vehicles for bringing teams together to develop iterative rounds of prototyping. Because iteration speed is critical, a variety of process and equipment options are considered and tried, frequently imposing the need for specialized facilities.

After all potential processes have been identified, resources can then be allocated (equipment, materials, labor and schedules) for an agreed-upon set of experiments. The TKM provides the freedom to run through so many iterations as are practical within the established constraints of time and cost.

This paper will describe an environment and process that is supportive of this new kind of NPD management.