

Models of innovation contribution towards innovation management in organizations ...

[Technology](#), [Innovation](#)



(a) Explain how the four main schools of thought: serendipity, linear models, simultaneous coupling model and interactive model, have contributed to our understanding of managing innovation within organisations. (30%) What is innovation in organizations? Innovation, though used very widely, means different things to different persons/bodies. There are as many definitions as there are authors. However, the definitions of innovation differ in two major ways. The first difference relates to what constitutes innovation and the second relates to the focus of the definition. (Sahay A, 2005 : 66).

Through these varieties of viewpoints, creativity is typically seen as the basis for innovation, and innovation is the successful implementation of creative ideas within an organization.

We focus our definition of innovation as a management process :- Innovation is the management of all the activities involved in the process of idea generation, technology development, manufacturing and marketing of a new (or improved) product or manufacturing process or equipment. (Trott P, 2005 : 15) In the organizational context, innovation may be linked to performance and growth through improvements in efficiency, productivity, quality, competitive positioning, market shares, etc. (University of South Africa, 2009) Models of Innovation Since the 1950s, there has been a proliferation of innovation models, each purporting to explain and/or guide the process of innovation within industrial firms. (Hobday, 2005 : 122).

Strengths and benefits of Innovation Models On the positive side, each generation of model captured the academic knowledge of the time and summarized perceptions of best practice. Each generation served as a

foundation for more sophisticated models allowing the incorporation of additional factors relevant to the innovation process. Also each model generated useful insights and hypotheses into the nature of innovation and decision making requirements at the level of the firm, pointing to important links between innovation and other key processes within the firm (e. g. management, marketing and manufacturing) and external to the firm (e. g. the S&T environment, universities and government policies). (Hobday, 2005: 127).

In addition to serving as a foundation for understanding, the various models have been widely used by companies within the Industrially advanced countries to guide the innovation process. Major consultancy firms frequently adopt one or other of the innovation models, and further develop them for guiding businesses wishing to improve their innovation processes. (Hobday, 2005: 127).

5 Caveats of Innovation Models According to Hobday (2005, 21) the following are the 5 caveats of innovation models :-1. The evolution from one generation to another does not imply any automatic substitution of one model for another; many models exist side-by-side and, in some cases, elements of one model are mixed with elements of another at any particular time; 2. Each model is always a highly simplified representation of a complex process that will rarely exist in a pure form; 3. Often the progress from one generation to another reflects shifts in dominant perception of what constitutes best practice, rather than actual progress; 4. The most appropriate model will vary from sector to sector, and between different

categories of innovation (e. g. radical or incremental); 5. The processes that occur within firms are to an extent contingent on exogenous factors such as the pace of technological change.

Four Models of InnovationIn this section the 4 models of innovation are described. These include Serendipity, Linear Model, Simultaneous Coupling Model and Interactive Model.

Serendipity:-Many studies of historical cases of innovation have highlighted the importance of the unexpected discovery. The role of serendipity or luck is offered as explanation. On closer inspection of these historical cases, serendipity is rare indeed. Most discoveries are the result of people who have had a fascination with a particular area of science and technology and it is following extended efforts on their part that advances are made.

Discoveries may not be expected, but in the words of Louis Pasteur, “ chance favours the prepared mind.” (Trott P, 2005 : 21)**Linear models:**-Figure 1Early models regarded innovation as a linear process: a sequence of activities driven either by ‘ technology push’ (basic advances in knowledge) or ‘ market pull’ (social or economic opportunities that provide an incentive for risk taking investment to seek new solutions). (Attridge J. 2006 : 3).

See figure 1 for schema of technology push model. The technology push model is where it is assumed that scientists make unexpected discoveries, technologists apply them to develop product ideas and engineers and designers turn them into prototypes for testing. It is left for manufacturing to devise ways of producing the products efficiently. Finally marketing and

sales will promote the product to the potential consumer. In this model the market place was a passive recipient for the fruits of R&D (Trott P, 2005 : 22).

Figure 2 It was not until the 1970s that new studies of actual innovations suggested the role of the marketplace was influential in the innovation process. This led to the second linear model, the “ market-pull” model of innovation (see figure 2). The customer need-driven model emphasises the role of marketing as an initiator of new ideas resulting from close interactions with customers. These in turn, are conveyed to R&D for design and engineering and then to manufacturing for production. (Trott P, 2005 : 22) Simultaneous coupling model:-Figure 3 The emphasis is on integrating R&D and marketing. The simultaneous coupling model as shown in figure 3 suggests that it is a result of the simultaneous coupling of knowledge within all three functions that will foster innovation (Trott P, 2005 : 23).

Interactive model:-Figure 4 The interactive model links together the technology-push and market pull models. It emphasises that innovations occur as a result of the interaction of the marketplace, the science base and the organizations capabilities. Like the coupling model, there is no explicit starting point. The innovation process outlined in figure 4 represents the organisations capabilities and its linkages with both the marketplace and the science base. At the centre of the model are the organisational functions of R&D, engineering and design, manufacturing and marketing and sales. While at first this may appear to be a linear model, the flow of communication is not necessarily linear. There is provision for feedback. Also linkages with the

science base and marketplace occur between all functions , not just with R&D or marketing. Finally, the generation of ideas is shown to be dependant on inputs from three basic components: organisational capabilities; the needs of the marketplace ; the science and technology base. (Trott P, 2005 : 24).

Innovation as a management Process According to Trott (2005) innovation is not a singular event, but a series of activities that are linked in some ways to the others. This may be described as a process and involves :-A response to either a need or an opportunity that is context dependant; A creative effort that if successful results in the introduction of novelty; The need for further changes.

Indeed, as we have seen, innovation is extremely complex and involves the effective management of a variety of different activities. It is precisely how the process is managed that needs to be examined. (Trott P, 2005 : 25).

A framework is presented below in Figure 5 that helps illustrate innovation as a management process. This framework does not pretend to any analytical status, it is simply an aid in describing the main factors which need to be considered if innovation is to be successfully managed.

Figure 5As shown in the framework above, scientists and engineers within the firm will be continually interacting with fellow scientists in universities and other firms about scientific and technological developments. Similarly, the marketing function will need to interact with suppliers, distributors, customers and competitors to ensure that the day-to-day activities of

understanding customer needs and getting products to customers are achieved. Business planners and senior management will likewise communicate with a wide variety of firms and other external institutions. All these information flows contributes to the wealth of knowledge held by the organisation. Recognising this, capturing and utilizing it to develop successful new products forms the difficult management process of innovation. (Trott P, 2005 : 25).

Creativity and idea generation Creativity can be divided into two parts: knowledge creation and subsequent idea generation. " Knowledge creation is not a mappable process but a multi-source phenomena which can lead to idea generation knowledge creation is the basis of idea generation. The former can be completed through the interaction between tacit and explicit knowledge. Tacit knowledge is resident within the individual or collective parts of the organization, whereas the explicit knowledge is specific articulated knowledge. " (McAdam, 2001)The framework in figure 5 emphasises the importance placed on interaction (both formal and informal) within the innovation process. There is a substantial amount of research stressing the need for a ' shared language' within organisations to facilitate internal communication. Hence there needs to be an overlap of knowledge in order for communication to occur. These interactions provide the opportunity for thoughts, potential ideas and views to be shared and exchanged. Finally the centre of the framework is represented by the process of new product development.

Four Models Contribution to process of Innovation Management
The Linear Model, Simultaneous coupling model and Interactive models are discussed in this section with regards to the model presented in “ Innovation as a management process” section. The explanation of the interaction of these activities forms the basis of models of innovation today.

Serendipity
Serendipity plays a role in scientists unexpected discoveries. Serendipity is found mainly in the Research and Technology function where there are likely to be many individuals who are fascinated in their fields which will lead to unexpected discoveries. This function is important in the management of innovation and is an entity in the framework.

Linear Model
The linear model primarily recognizes that innovation occurs through the interaction of the science base (dominated by universities and industry), technology development (dominated by industry) and the needs of the market. All subsequent models of innovation consist of these functions. Similarly in the framework for management of innovation there exists the 3 entities :- marketing, research and manufacturing, and business planning. Whether one lists 2 functions or seven functions misses the point, which is that it is the interaction of these internal functions and the flow of knowledge between them that needs to be facilitated. Similarly effective communication with the external environment also requires encouragement and support.

The technology push model will absorb research and technology from external inputs and the market pull model will also absorb marketing information from external inputs. Similarly in framework for innovation

management need to consist of these external inputs for the different functions of Research and Marketing.

According to Jahannessen JA, 2009 : 159, the linear model is mainly based on formal knowledge (explicit knowledge). This helps in the contribution towards idea creation and towards the new product/service development process.

Simultaneous couplingCoupling of knowledge within functions will lead to the facilitation of internal communication between departments. The point of commencement for innovation is not known in advance and therefore new innovation can stem from any or a combination of sections. This model encourages need to share and exchange knowledge. This will emphasize the importance placed on interaction (both formal and informal) within the innovation process. The interactions as well as the uncertainty of the point of commencement of innovation needs to be clearly represented in managing innovation (as seen in the framework).

Interactive ModelIt is the emphasis on a variety of knowledge types, and the links between them which is regarded as the most valuable resource in the interactive model, and interactive learning is regarded as the most important process (Lundvall, 1992 : 9).

Another dominant feature pertaining to the interactive innovation model is the store set by collaboration, as opposed to the emphasis on competition (Lundvall and Johnson, 1994 : 26).

All activities are seen as part of a bigger system of relations among various elements which may include activities in Finance and business leadership, Marketing and Research and Technology. This model highlights the importance of interaction and communication within and between functions and with external environment which is needed in the management of innovation. (This is the basis of the framework) Note :- Looking at caveats in the section “ 5 Caveats of Innovation Models” (above) it can be noted that a later model may expand from an earlier model. ie Linear model expands from Serendipity, Simultaneous coupling expands from Linear, Interactive expands Simultaneous coupling. Therefore, since the interactive model most closely represents the theory of managing innovation, all previous models have automatically contributed to this.

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