
Introduction

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Biographical notes: A.J. (Gus) Berkhout started his career with Shell in 1964, where he held several international positions in R&D and technology transfer. In 1976, he accepted a chair at Delft University of Technology in the field of geophysical and acoustical imaging. During 1998–2001, he was a member of the Board, responsible for scientific research, knowledge management and intellectual property. In 2001, he also accepted a chair in the field of innovation management. Professor Berkhout is a member of the Royal Netherlands Academy of Arts and Sciences (KNAW) and the Netherlands Academy of Engineering (NFTW).

Scholars, public officials and business people agree that innovation is crucial to the survival of organisations. Being innovative is almost synonymous with staying successful. Through the years, governments have realised the importance of technological development to gain political, military and economic power. Companies have also realised that new products and services must be developed to maintain market share and to enter new markets. Customers were no longer satisfied with more of the same but were constantly looking for ‘something better, something more exciting, something more valuable’.

This Special Issue focuses on a better understanding of the process of innovation, both from an industrial and an academic point of view. The 12 selected papers – six from the industry and six from the academic community – confirm that there exists a significant gap between the best practices in industry and the scientific models in the academe.

In industry, methods and tools are developed on how to organise and manage innovation processes with the objective to better control value, risk and cost. Employees, suppliers and customers are principal actors in the process.

In the academe, information from observations and case studies is transformed into scientific knowledge with the objective to better understand the successes and failures in innovation and, ultimately, to improve the predictability of the outcome. Through the years, innovation models have been improved. However, this Special Issue points out that current models are still too limited to describe the diversity and dynamics of the real innovation world. This observation is confirmed by the fact that the rate of failures in innovation remains high, despite the extensive research in this field.

In this introduction to the Special Issue, a few observations are made on drivers and approaches as they occur in today’s innovation arena, and some remarks are made on leadership in the innovation system of the future.

Innovation drivers

If we look at how innovation is fuelled today, two principally different drivers can be distinguished. One is technological capability and the other is market need.

Innovations driven by new technology are of an exploratory nature. Creativity is used to make new discoveries (part of the research process) and generate new ideas (part of the development process). These discoveries and ideas are then extrapolated to new technical functions. Customers have not been identified yet. Here, the innovation process is often presented by an 'innovation funnel', showing the process along a time path subdivided into stages and decision points.

Innovations driven by customer needs are of a backcasting nature. The specifications of demanding clients are used to give direction to the solving power of a company (or alliance of companies for that matter). Here, the innovation process is often presented by an 'innovation roadmap', showing step by step what needs to be achieved to arrive at a solution that meets user specifications.

We can observe a trend, indicating that a combination of technological capabilities and market needs drives the innovation process. Using an iterative process of *funneling* emerging capabilities and *roadmapping* emerging needs, strategic decisions are based on the criteria value, risk and costs involved.

Innovation approaches

If we look at how innovation is managed today, two principally different styles can be distinguished. The first is top-down strategic planning and the second is bottom-up adaptive learning.

Innovation projects being managed according to a strategic plan are regularly judged by a committee of experts. Project continuation and resource allocation are decided by this committee. Minimising risk is an important issue in this approach.

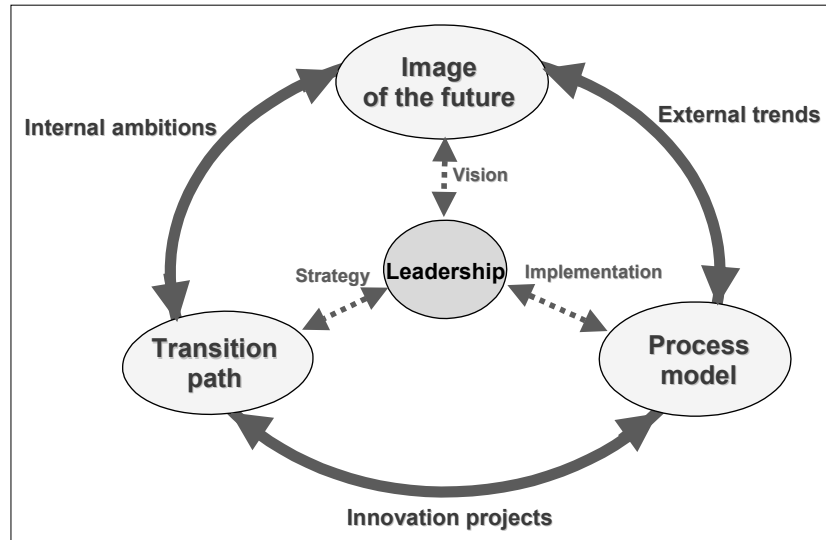
Innovation projects managed by a self-organising concept show that the responsibility for success is delegated to the project teams. Feedback from success and failure causes continuous adaptations along the innovation path. These adaptations facilitate a learning process in the teams. Maximising opportunity is an important issue in this approach.

We can observe a trend that indicates a smart mix of centralised strategic planning and decentralised adaptive learning is aimed for in innovation management. This means that a compromise between minimising risk and maximising opportunity is looked out for. Innovation practice shows that large companies emphasise the risk issue, and small companies emphasise the opportunity issue. This explains why large companies increasingly aim for strategic alliances in innovation. It also explains why radical innovations often occur in small companies.

Bridging the gap

As mentioned above, scientific models through the years have been improved. Until now, however, these models are still too limited to describe the complex innovation world. A possible solution to further improve the applicability of academic models is to describe the system of innovation by three interrelated levels. This is shown in Figure 1.

Figure 1 System of innovation, showing three interrelated levels. Different styles of leadership are characterised by the difference in emphasis given to the three levels.



The highest level is the level of vision. It reveals an inspiring *image of the future*. On the one hand, this image shows how our future world will look like. On the other hand, this image shows the company's choice of internal ambitions within this changing global context. Vision building is the creative process of extrapolating a mixture of scientific, technical, economic and social signals of change into the future, using knowledge and professional intuition.

The next level represents the level of strategic planning. In this level, we determine what approach will be used to reach the company's goals as formulated by the vision. Strategic planning comprises a linear stage-gate process along the *transition path* – from today's situation towards the desired future, using project evaluation and resource management.

The third level is the level of actual innovation activities. The underlying *process model* must include self-organising workflows with ample space to think, communicate and act. Business guidance is given by the project objectives, determined by the company's image of the future. In process models for innovation, entrepreneurs should be the key players.

Note that the third level (*i.e.*, the level of action) produces the new innovations. These innovations, therefore, influence again the future. In Figure 1, the third level is connected with the first level, showing that new innovations create new visions.

It is interesting to learn from this Special Issue that industrial models for innovation processes are often formulated in terms of a linear stage-gate process along the transition path. This means that the organisation of the multi-disciplinary workflow within and between the innovation teams – the third level – is not specifically addressed in these models.

Leadership

Innovation cultures in countries, regions and companies are determined by the difference in emphasis given to the three levels of the innovation system. These differences characterise the different styles of leadership.

Emphasis on strategy leads to a centrally oriented innovation system. In this system, leadership is characterised by *managing* and *controlling* the innovation process. Emphasis on implementation leads to a decentrally oriented innovation system. In this system, leadership is characterised by *inspiring* and *facilitating* the innovation process.

Today, we live in a transition period. We are moving from an efficiency-driven knowledge economy towards a value-driven innovation economy. This transition requires a new type of leadership where an inspiring vision is giving direction to the strategic decisions and where entrepreneurship is empowering the creativity process.

Special issue

This Special Issue on innovation brings views of industry and academics together in one volume. The Editorial Board hopes that this initiative will help increase the interaction between both communities, ultimately leading to a significantly higher success ratio in the practice of innovation.