
Editorial: Continuous Innovation

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During two decades of globalisation, the external dynamics of industrial firms have increased considerably in terms of market and technological change to which organisations are learning to adapt. Under such conditions competition requires companies to respond quickly and accurately to customer requirements; yet at the same time, they must prepare for the future by being able to change supplies, incorporate new technologies and constantly develop new products or services that provide customers with increased value in terms of functionality and performance.

These trends call for changes. Organisations need changes 'from stem to stern'; they need to look back and learn from the past and to look forward and redesign for the future. Changes may roughly be separated into two categories: a capability to plan and implement radical changes within a short period of time, while achieving high precision results and a capability for rapid learning and incremental improvement of existing and newly introduced resources.

It is our view that the two predominant approaches to organisational change –radical innovation and incremental improvement –have contributed significantly to the increased competitive strength of many companies, in their own right. Recent developments in (Western) management theory seem to suggest a gradual switch in attention over time from incremental towards radical change. The quality movement, which employs incrementalism as the major driver of change, has been succeeded by redesign/reengineering, which basically makes use of more radical approaches to change. There is an emerging need to understand better how these approaches can work in combination or/and concurrently. Furthermore, if the two approaches could be combined more effectively, despite their different 'nature', still greater potential could be realised. In this issue we start to explore the viability and pursue an understanding of, the combination of radical and incremental change.

For such a combined approach to change to become operational, the concept of Continuous Improvement would need to be further developed in two directions. Firstly, it must be directed beyond the individual firm to supply chains and networks and secondly, the primarily repetitive processes, which characterise current Continuous Improvement models, must be combined with or even integrated into more radical innovation processes.

The present issue of the *International Journal of Technology Management* originates from selected papers presented at the *3rd International CINet Conference*, 'CI 2000: from improvement to innovation', hosted by the Center for Industrial Production and the Department of Production at Aalborg University, Denmark. This journal also hosted special issues based on papers from the *1st and 2nd EuroCINet Conferences* in 1996 (Vol. 14, No. 1, 1997) and in 1998 (Vol. 22, No. 4, 2001), respectively.

The CINet (Continuous Innovation Network) currently represents 12 countries across three continents. One of the network's aims is gradually to globalise and to expand its (previous) focus from Continuous Improvement to what has been labelled 'Continuous Innovation' – an effort that marks an attempt to address the challenges outlined above. Towards this objective, the CI2000 conference was intended to trigger discussion and development of the theory and practice of combining Continuous Improvement, learning and more radical types of innovation, as well as widening the application of Continuous Improvement beyond the industrial shop floor to inter-organisational processes, such as supply chains, for example. The underlying premise guiding these activities is that organisations in the future will rely more and more on commitment to learning and diffused innovation as an ongoing interactive process, at all levels and parts of their organisations and networks, in order to sustain and renew their business vitality.

Combining improvements and more radical types of innovation is by no means a trivial undertaking in terms of either understanding or practice; it is subject to an ongoing discussion among scholars and an unceasing subject of prioritising and balance in corporate practice. Similarly, applying Continuous Improvement beyond the shop floor to non-routine processes and inter-organisational settings is a real challenge to both scholars and practitioners. The submissions of the contributing authors to this issue can be viewed as the commencement of approaching the challenges of Continuous Innovation.

In the first article 'From continuous improvement to continuous innovation: a (retro)(per)spective' by Harry Boer and the guest editor, Frank Gertsen, the authors set the stage for a new industrial game: 'Continuous Innovation'. The article is conceptual and offers a general definition of the concepts, which takes the position that the renewal should be found in the difficult – perhaps even impossible – process of combining existing knowledge and practice of different fields to achieve: "...the ability to combine operational effectiveness and strategic flexibility". The concept is discussed against related theory of the past and more contemporary theory compiled from three conferences. Based on an analysis of the papers presented at the 1995, 1998 and 2000 conferences of the (Euro)CINet, the article concludes that the fields of innovation, learning, and continuous improvement are gradually converging into what would more appropriately be labelled continuous innovation. Some serious weaknesses in this 'continuous innovation research' are also presented in this paper, in the form of an agenda for further research to meet an urgent need for actionable continuous innovation theories.

The article 'Application of integrated quality management systems to promote continuous improvement and learning in R&D organisations', by Dilani Jayawarna and Alan W. Pearson, is built on the paper that received the CI2000 best paper award. The article contributes to establishing an improved understanding of the nature of Continuous Improvement in research and development (R&D). It concludes that the three concepts of quality management, learning and Continuous Improvement, are intricately linked and that the formal character of most of the practices in R&D means that Continuous Improvement cannot stand alone as a flexible approach to managing quality. An appropriate balance between formality and flexibility is required for a complete and supporting infrastructure to operate Continuous Improvement within R&D. Two case studies demonstrate that the Continuous Improvement mechanisms are concrete and operational in creating, sustaining and improving learning in R&D organisations. The patterns of learning lie in three routes ranging from the extremes of feedback processes

through feed-forward planning to infrastructural enablers. This pattern indicates that the Continuous Improvement process within R&D can have an influence at three levels: project, process and strategy.

In their article 'Fostering continuous improvement within new product development processes', Sarah Caffyn and Andrew Grantham draw on data from an action research study of Continuous Improvement in product innovation. The conceptual framework for this research is a previously developed Continuous Improvement Capability Model, which is a behavioural model that describes and conceptualises Continuous Improvement in terms of a set of generic behaviours that appear to be essential for long-term success. These behaviours may be fostered by a wide range of enabling mechanisms, 'CI enablers'. The article focuses on enablers designed to foster organisational learning behaviours in NPD such as the search for learning opportunities, capturing, sharing and deploying learning within and between projects. Evidence from the project suggests that the capture, sharing, and deployment of learning in the NPD function of SMEs is generally weak. It also suggests that review-type NPD Continuous Improvement enablers have an inherent value, but are impeded by the limited ability of NPD personnel to reflect on processes. This limited value is due to such factors as poor understanding of procedure, low confidence in existing procedures, limited belief in the need to formalise knowledge capture, and (too much) problem-orientation.

The article by José F.B. Gieskes and Paul W. Hyland explores 'Learning barriers in continuous product innovation', taking the point of view that it is necessary to gain insight into factors that hinder learning and to design effective intervention strategies that may help remove barriers to learning in order to be able to stimulate and facilitate learning in product innovation. Based on a survey, the article reports on learning barriers identified by product innovation managers in over 70 companies in the UK, Ireland, Italy, Netherlands, Sweden and Australia. The results show that the majority of the barriers identified can be labelled as organisational defensive routines leading to a chain of behaviours: lack of resources leading to under-appreciation of the value of valid information, absence of informed choice, and lack of personal responsibility. An intervention theory is required that enables individuals and organisations to interrupt defensive patterns in ways that prevent them from reoccurring.

'Knowledge management in continuous product innovation: a contingent approach' was written by Stefano Ronchi, Ross Chapman, and Mariano Corso. The article identifies and analyses the relationships between contingent variables and managerial approaches to knowledge management within product innovation in a survey-based study of 70 European and Australian firms. The results indicate that small entrepreneurial companies mainly adopt an organisational approach to knowledge management within product innovation, large standardised companies tend to prefer a technical approach, global companies are more likely to adopt a 'complete' approach by focusing on the whole set of managerial levers, and finally local standardised companies put their managerial efforts into solution and procedure oriented approaches. Although findings in the paper cannot be directly generalised, the results shed more light on the complex relationships between knowledge management practices and industry and firm characteristics.

Whereas articles number two to five contribute to theories of designing Continuous Innovation in terms of e.g., 'factors', 'enablers', 'relationships', the last two articles contribute to theories of the implementation process.

'Bottom-up or top-down? Evolutionary change management in NPD processes' was submitted by Riitta Smeds, Päivi Haho, and Jukka Alvesalo. It presents theoretical evolutionary change management principles and a simulation game-based business process development method built upon these principles. The authors applied the method in two NPD process development projects, one in a bottom-up initiated change project in a pharmaceutical company and the other in a top-down initiated project of a telecommunications company. The two change projects were managed as action research projects according to the generic principles of evolution management. A dynamic dialogue between operational processes and strategy was achieved. Starting either top-down or bottom-up, both NPD process development projects combined operational and strategic development for successful process innovation. This dynamic dialogue was triggered and sustained through successive simulation games producing a relatively successful change process. The cases suggest that the management of process development would benefit from systematic project portfolio management, as well as project management, to select and manage more effectively the emergent ideas towards successful process innovation. To develop their capability of evolutionary process innovation and strategic renewal, both companies should continue consciously to manage the dynamic dialogue between strategy and process; between top-down and bottom-up change management.

The last article 'The problem of using hierarchy for implementing organisational innovation' was written by Roel W. Schuring, Harry Boer, Clementine Harbers, Martine Kruiswijk, and Sander Rijnders. The article addresses the vastly neglected field of implementation; more specifically, the problems of implementing continuous improvement programs in a process perspective. The article illustrates through two case studies that the implementation of a Continuous Improvement program is a problematic process, especially if the program is implemented using the existing hierarchy. The cases show that a hierarchical approach is not suited for furthering, detailing and implementing the general ideas behind Continuous Improvement. A much wider awareness, learning, valuing and participation in the Continuous Improvement-program seems to be needed, which –according to the findings –is scarcely achievable through the use of the existing hierarchy. As an implication of this premise, the authors generate the contours of an alternative approach called, 'participative embedding', which suggests that a temporary process stage of partly unfreezing of the hierarchy be added to the process of implementing Continuous Improvement.

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