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# Innovative Quality Improvements in Operations

Introducing Emergent Quality Management



Springer

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# Preface

In research focusing on innovation, design, and engineering, there is a belief that such research contribute to society with new solutions, products, and services for the future. But what will the future look like? Future scenarios are often based on what we understand from the present and the past. This can be explained by the fact that human beings are largely unable to think of or imagine something that goes beyond their own personal experience. Already in the eighteenth century Immanuel Kant (1724–1802) claimed that we are not able to think of something that we have not experienced personally, whether personal lived experience or something that we have read or heard from other people. Though there is an ongoing intense and lively debate about the negative effects of climate change and limited natural resources, we can hardly imagine a future without oil, electricity, or food supplies—at least not in the Western world; in many parts of the world this is a reality.

Building a better world requires incorporating insights from the fields of design and engineering design, which contribute solutions to help people improve their living conditions. It is often seemingly minor innovations that lead to dramatic increases in living standards. This book was written by researchers or partners in the Innovation and Product Realization (IPR) division within the School of Innovation, Design, and Engineering at Mälardalen University in Eskilstuna, Sweden. The point of departure at IPR is in a vision of Mälardalen University as a contributor of benefits and values in terms of coproduction, internationalization, and academic excellence. IPR is contributing to a sustainable future, societal development, and industrial renewal from a holistic perspective that takes individuals, systems, and global challenges into consideration in both research and education. This vision guides IPR's interdisciplinary research and educational environment, which consists of scholars, teachers, and graduate students with competencies in various scientific and pedagogical disciplines such as engineering, social sciences, humanities, and art.

Contemporary society faces many emerging or increasing challenges for enterprises and other organizations related to professional life. Many organizations must undergo continual development. This book was written as an answer to this challenge, discussing and suggesting approaches to quality management, operations

management, and innovation management to deal with the task of focusing on innovation, to face the future and remain competitive.

Competitors are diverse, depending on the context, and are located around the globe, from non-European countries to North America, Asia, and Africa. Trade agreements can serve to protect individual countries or federations, whereas research often crosses borders and is considered a global activity. Collaboration in research often leads to new results that will have an impact on people, regardless of nationality or cultural background, as long as the economic resources are available. Research can lead to several kinds of innovation: social innovation, in areas such as health care, teaching, and infrastructure; technical innovations; and innovations in processes. Innovation can come about, for example, by incremental improvements in a design process or production system or by radical and disruptive changes.

Digitalization is high on the agenda of most governments in Europe and the European Union, and there are high expectations with regard to digitalization and how it can enhance flexibility in manufacturing within different kinds of organizations. Digitalization will affect professional competencies as well as professional identities. It will probably also change workplace practices in terms of how flexible one can be and at what cost. However, this is a deterministic view of digitalization, and we might think of alternatives. We must also consider how big data and data visualization will affect how we access data and our ability to decode and use data in a relevant and accurate way. A particular visualization may be too complex or too much information may be extracted to give a comprehensible picture of a complex phenomenon. The gap between those who are digitally savvy and those who are not is often overlooked.

Globalization is another challenge faced by contemporary society. This refers not only to globalizations of local companies but also an increased flow of people from other parts of the world with different experiences, cultures, religions, and languages. This can enrich local cultures if immigrants become fully engaged in their new society, but it could also lead to the opposite if the local society refuses to accept the fact that we live in a global society.

Project managers or organizations that have an awareness of how the inclusion and involvement of several perspectives can lead to intellectual growth in organizations in general or a particular project and support creativity and innovation commonly must have a holistic view. This comes from not only various disciplines, for example, the humanities, social sciences, engineering, and design, but also from people's different experiences. To meet future challenges and contribute to the building of a sustainable society, a holistic perspective, in which societal needs are taken into consideration with regard to humans and the environment, is required. This also demands an ethical perspective where technological developments do not occur in isolation from the local or global context. What impact will a new product or service have on individual lives, on groups, and on the local and global society? What is the role of the university in times of change?

Universities are required to have an impact on society and to collaborate with external parties such as public organizations, companies, and civil society. Collaboration and coproduction with nonacademic parties require other

competencies among academic staff compared with more traditional academic research, especially in coproductive research, since coproduction involves the employer in the external organization of the research, for example, in the framing of a problem, formulating the purpose of the research, and engaging in the actual research activities. Although the purpose of a project may be formulated by an outside company and an academic institution, the two have different obligations, for example, the company needs to solve a specific problem while the academic institution wants to gain deeper and more generic knowledge in a field. Even if a project is conducted as a productive effort and has an impact on the company, it will not necessarily create value for either society or the university. Value is in and of itself a complex concept, but a trivial criterion is that the involved organizations in a project benefit from the result. If a researcher is unable to formulate research questions in relation to his or her own research area, the result will probably not contribute to the actual research area. The university has a responsibility to ask whether and how a research project or proposed learning outcomes will contribute to the local or global society. With regard to Swedish law on higher education, universities must support sustainable development, which is defined as a healthy and respectable environment, economic and social welfare, justice and equality between men and women, and an understanding of other countries and international affairs. To what degree is research responsible to society? Professor Göran Bexell, former vice-chancellor of Lund University, writes that every individual researcher as well as the departments, faculty and the university are responsible for: choice of research subject, methods, effects of the results and to take part in contemporary debates.

IPR works in three different focus areas of research: information design, product and production development, and workplace innovation and quality management. These areas of focus are divided into three subgroups. The Information Design Research Group has a human-centered design perspective; the group creates knowledge and understanding of how space, text, and visuals communicate messages and contributes to the development and renewal of information design. The Product and Production Development Research Group creates knowledge on the renewal and development of products and production systems. The group contributes by understanding and developing factors crucial for a company's competitive capacity. The Workplace Innovation and Quality Management Research Group uses and develops tools and methods for analyzing how to handle and facilitate change processes in which coworkers take part. With an interest in complexity and organizational learning and with a focus on dilemmas in production system designs, the research group contributes to the fields of innovation management, quality management, and operations management. The main part of the research that is conducted in the IPR research environment is done in collaboration with external organizations. To develop the methods for research in coproduction, IPR has established a living lab. Several of the methods described in the book are developed in living labs; see the chapters written by Melkas, Uotila, and Oikarinen (Chap. 6), Chirumalla (Chap. 7), and Schaeffer (Chap. 8).

The main activities in living lab projects include *exploration* with users, *experimentation* with users, and *evaluation* with users. The research at MDH Living

Lab@IPR takes multiple interests into consideration and works with the concept of community of inquiry and in that way involves groups of individuals in the design process in a company or organization. This means that we regard all stakeholders/employees in an organization or in a product life cycle chain as users. All user groups are embedded in social knowledge and codes, in addition to their working skills. We perform these activities in more of a spiral and iterative, rather than sequential, way. It is a process that contains methods for knowledge exchange; however, even though there is an awareness of the importance of knowledge exchange in order to fulfil a coproduction commitment, it is not an easy task. The academic staff struggle with their traditions about what is required from research projects, and external parties do not necessarily have any experience when it comes to research. This could lead to wrong expectations from both sides: the academic staff do not understand what knowledge they need from the external parties to understand the problem, and the external parties do not necessarily know what to share. The aim of the Living Lab@IPR is to develop methods and tools that support not only coproduction but also the co-creation of new knowledge.

The advantage of coproduction must be explored from several perspectives. Studying problems that organizations outside universities deal with leads to opportunities for university researchers to reflect on their own work and to challenge themselves by formulating their knowledge together with an external party in such a way that it may be useful in terms of framing a problem. A theoretical model for higher education institutions is the knowledge triangle, which highlights the relation between research and education in an attempt to spur innovation.

Eskilstuna, Sweden

Yvonne Eriksson

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