Learning from the history of innovation

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Abstract

This letter describes an approach to learn from the history of innovation by studying how organizational and regional innovation cultures developed over time, using a research-based framework of nine innovation dilemmas. The purpose of this letter is to contribute to the debate on how we can learn from the history of innovation in such a way that an understanding of the past supports innovators, decision makers and policy makers to improve future innovation performance. This letter also serves as an invitation to the community to engage in the discussion on how looking back at the history of innovation can help prepare for the future.

Keywords: Culture; Innovation; Dilemmas; History; Diversity.

1 Introduction

Back in 2017, the editors of the Journal of Innovation Management (JIM) argued in an editorial (Ferreira et al, 2017) that there was a need for cooperation between historians and innovators so that today's innovators can learn from the past: "We would like to challenge a combined effort of historians and innovators to seek cooperation and lend each other a helping hand!" The editors had a point. Existing historical approaches to innovation are mostly anecdotal (e.g., Johnson, 2010), and often end up in recipes for innovation based on an inventory of successful innovations in the past. A more theoretically grounded understanding of the history of innovation would help innovators and managers of innovation to avoid pitfalls, make better informed choices and create an environment in which innovation can flourish, in other words to develop resilient cultures of innovation. More theoretically grounded 'lessons learned' from the history of innovation would also be beneficial for training a next generation of innovators, by including the history of innovation in educational curricula - not just for university students but for students at all levels.

2 Innovation as a panacea?

Five years after the publication of the editorial in JIM, publications on the history of innovation are still often limited to success recipes based on anecdotal evidence, and attention for the history of innovation in the curricula of educational institutes is still mostly limited to case studies of successful innovations and innovative companies and other organizations. In fact, over the last decades innovation has developed a reputation as something inherently positive, a panacea for resolving virtually all problems. Failures of companies, organizations, regions and even nations are routinely explained as caused by lack of innovation. It is important to realize that over history,

innovation has not always been seen as something that is by definition positive. The attitude towards innovation used to be more ambivalent. In ancient times, innovation was even used as a derogative term because it was associated with subversiveness (Godin, 2015) - it only developed a positive connotation because of its later association with science and entrepreneurship (Drucker, 1985). It can be argued that we took that positive connotation too far, indeed making out that innovation is often seen as a panacea, and leading to the expectation that a next wave of innovation will solve all problems – such as the naïve belief that we are currently in a 'green wave' of innovations that will solve all our environmental problems. A more ambivalent attitude to innovation would help to realize that innovation waves do not automatically deliver positive results – they often come with problems that need to be addressed in subsequent waves. For instance, previous innovation waves brought us monopolies in the energy sector that actually hindered further innovation and have contributed to the root causes of climate change. Innovations such as the insecticide Dichlorodiphenyltrichloroethane (commonly known as DDT), leaded petrol and budget airlines were all seen as great innovations at the time of their introduction, but were later recognized as causing huge environmental problems. A wave of financial innovations in the 1990s brought us two financial crises in the 2000s (Mention and Torkkeli, 2014). Only recently we started to realize that the social media/smartphone innovation wave went together with a problematic rise of disinformation and concentration problems. The long term impacts of digital technologies on mental health and on the development of children still need to be explored (Mention et al, 2020). Moreover, innovation waves have gone together with fraudulent claims by self-proclaimed unscrupulous innovation leaders, as we have recently seen in the biotechnology sector. An example is the case of the company Theranos founded by Elizabeth Holmes in Silicon Valley in 2004. Holmes claimed that Theranos would trigger a revolution in health care by its innovative blood test. The claim lured investors into multi-million investments and raised great interest for the test among the general public. Holmes made a deep fall when it turned out that the Theranos blood test was not based on scientific research and that the claims were fraudulent (Das and Drolet, 2022).

The danger of portraying innovation as a panacea, a solution for all problems, is that we do not learn from mistakes and failures in innovation processes from the past. Anecdotal approaches to understanding the history of innovation often lead to one-sided recipes, as reflected in titles of popular books such as 'open innovation', 'cooperative innovation', 'creativity and innovation', 'democratizing innovation', and 'customer driven innovation'. However, practitioners and theorists of innovation have shown that innovation is full of tensions, dilemmas, and contradictions (Takeuchi et al, 2008; Prud'homme and Dankbaar, 2009; Christensen, 1997), and that innovation challenges cannot be mastered with one-sided recipes: innovation needs openness *and* closedness, cooperative *and* competitive attitudes, creativity *and* discipline, democracy *and* decisiveness, and needs to be knowledge driven *and* demand driven.

3 Dilemma Approach to understanding the history of innovation

The Dilemma Approach to understanding innovation challenges is closely related to the lessons learned from the interplay between diversity, innovation, and culture, one of the fields to which the Journal of Innovation Management has contributed (e.g., Gallou et al, 2021). Research shows a positive correlation between innovation performance and cultural diversity, which can be explained by the different backgrounds that people from different (national-, regional-, organizational-, professional-, gender-, age-, etc.) cultures use in their approach to innovation challenges. People from different cultures tend to go for different solutions, which are all different positions on
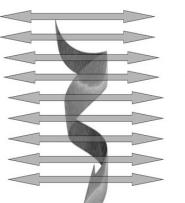
a continuum of 'fields of tension' or cultural dilemmas. A comprehensive framework of nine innovation dilemmas allows for a structured analysis of the history of innovation, by a systematic analysis of how innovation dilemmas are handled over time and how this results in the development (and ultimately, the demise) of innovation cultures (Prud'homme van Reine and Dankbaar, 2009; Takeuchi et al., 2008). Benefiting from cultural differences and developing cultures of innovation requires maintaining a dynamic balance on these cultural dilemmas. One example is the dilemma of innovation leadership between strong, decisive (and sometimes authoritarian) innovation leadership and consensus-driven, democratic innovation leadership. The history of innovation, e.g. at Xerox Parc and Apple, shows that developing a resilient innovation culture requires innovation leadership that balances hierarchical and egalitarian approaches. Christensen's 'innovators dilemma' (Christensen, 1997) comes back in the dilemma framework in the field of tension between radical and incremental innovation. Schumpeter (1912, 1942), who could be seen as the first historian of innovation, already identified an innovation dilemma when he argued that while invention is mainly about creativity, innovation is about connecting creativity to structured processes. Many years later, Steve Jobs attributed his success as innovation leader to his ability to find a balance on the dilemma between structure and room for creativity: 'I am one of the few people who understands how producing technology requires intuition and creativity, and how producing something artistic takes real discipline' (Isaacson, 2011, p. 397).

Innovation benefits from diversity, but understanding the history of innovation can benefit from diversity as well. An analysis of the history of innovation by researching how dilemmas have been handled over time requires a multidisciplinary approach, combining scientific, technical, sociocultural, economic, geographic, and of course historical approaches. Such multidisciplinary studies are rare. An exception is the book 'Guns, Germs, and Steel' by the physiologist Jared Diamond (1998), which discusses the history of civilizations but is at its root a history of innovation and how it travels across time, among groups of people and over spatial barriers. Diamond works at the borderline between science and the humanities by bringing in technical scientific knowledge and a scientific approach to studying human history. His conclusions include the need for balance between competition and cooperation, and between unity and fragmentation, both tensions that are covered by the framework of nine innovation dilemmas.

The book "Innovation Culture, Learning from the History of Innovation" (Prud'homme van Reine, 2022) uses a multidisciplinary approach as well. It applies the 'nine dilemmas model' to an analysis of the history of innovation and derives lessons from it. The book connects well-known and less-known cases from the history of innovation to the research based model of innovation cultures to discuss how individual innovators, companies and regions have handled the nine fundamental fields of tension or 'innovation dilemmas': radical versus incremental innovation, knowledge driven versus demand driven innovation, relying on creative individuals versus innovation as teamwork, stimulating innovation by top-down policies versus leaving innovation up to bottom-up initiatives, open versus closed innovation, structure versus room for creativity, making innovation fun versus rewarding innovative performance, global sourcing versus local embeddedness, and short versus long term orientation. The fields of tension correspond to themes in the history of innovation such as innovation leadership, how to organize innovation, where ideas should come from, how to stimulate innovation and how to make use of diversity. The examples in the book cover a variety of industries including high tech-, oil-, chemical-, car-, and food-industry, services sector and health care sector, and innovation regions in a wide variety of countries including The Netherlands, US, Japan, Germany, South-Korea, Israel, France, Denmark, Finland, Singapore, Taiwan, India, UK, Switzerland, China, and Italy. It shows that lessons can be learned from the history of innovation about how to handle dilemmas in such a way that the positives of both extreme positions are

connected and a dynamic balance is maintained on each dilemma, and also about how to avoid the pitfalls that lead to a negative spiral and innovation cultures falling apart.

Figure 1 displays the framework of nine dilemmas and indicates how a dynamic balance can be developed on each dilemma.

1. **Incremental** ⟷ **Radical**
2. **Structure** ⟷ **Creativity**
3. **Knowledge driven** ⟷ **Demand driven**
4. **Closed innovation** ⟷ **Open innovation**
5. **Quality of life** ⟷ **Innovative performance**
6. **Local embeddedness** ⟷ **Global sourcing**
7. **Individualism** ⟷ **Teamwork**
8. **Autonomy** ⟷ **Top-down leadership**
9. **Short term value** ⟷ **Long term value**

1. *Resilient innovation culture*
2. *Disciplined creating*
3. *Design thinking for innovation*
4. *Networked innovation*
5. *Fun with a purpose*
6. *Benefiting from diversity: beyond the comfort zone*
7. *Competitive collaboration*
8. *Managed anarchy*
9. *Sustainable innovation*

Figure 1. Framework of nine innovation dilemmas and how to develop a dynamic balance

For instance, 'design thinking for innovation' connects seeing things from the perspective of the user with making prototypes using the latest technological developments, e.g. by creating 'Experience Labs' where potential users experience an innovative concept in a very early stage to discover the social and psychological implications of various technologies (Van Loenen et al, 2010). Maintaining a dynamic balance in the field of tension between 'embeddedness' and 'footloose innovation' requires connecting global and local knowledge networks to exploit the diversity of perspectives that cultural diversity brings. An example is how semiconductor manufacturing equipment maker Applied Materials brought together innovators from different cultures and used the migrant mentality of contrarian thinking, perseverance, belief in the impossible, and willingness to take risks, to develop unique innovative strengths. Similarly, 'remigrants' with this mentality were crucial for creating innovation cultures in the Bangalore-, Hsinchu-, Shanghai-, and Tel Aviv regions. The historical analysis shows that innovation thrives by enticing innovators to leave their comfort zone. Confronting innovators with a variety of perspectives through cultural diversity is an important step towards a 'beyond the comfort zone' innovation culture.

The innovative Dutch company in nutrition and bioscience DSM is an example of a company that managed to develop a dynamic balance on the individualism – teamwork dilemma by instilling a culture of 'competitive collaboration'. For instance, DSM rewarded a brilliant technician who was seen as an 'Einzelgänger' with an innovation prize and the status of senior research fellow, but also gave him a role in stimulating a team of researchers and process developers, and in coaching of new employees. With his original ideas and insights he made a unique contribution to creating team spirit and offering opportunities to talent, just as he had been given opportunities himself.

4 Concluding remarks and future directions

The integrative framework of nine innovation culture dilemmas seems to be a useful tool to study the history of innovation in a structured way, and to derive lessons, based on the past, for future innovation performance. Developing a sustainable innovation culture requires maintaining a dynamic balance on each of the 9 dilemmas or 'fields of tension'. The Dilemma Approach offers no 'recipes' or standard solutions but guidelines for a continuous process of making connections: 'disciplined creating', 'networked innovation', 'competitive collaboration', 'managed anarchy', and 'design thinking for innovation' to connect knowledge driven and demand driven innovation. Learning from the history of innovation is more important than ever to help design innovation strategies to make a badly needed 'green innovation wave' successful. Continued multidisciplinary research on the history of innovation, especially combined efforts of historians and innovators, will still be necessary. The dilemma framework also provides an analytical framework for teaching courses in the history of innovation, which will be conducive to strengthening the innovation skills of students at all levels, a prerequisite for a future in which innovating will be everybody's responsibility.

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Biographies

Peter Prud'homme van Reine. Peter Prud'homme van Reine was born in The Hague, The Netherlands, in 1955. He received an M.Sc. degree in Applied Physics from University of Technology Delft in 1978, an M.A. degree in Cultural and Organizational Anthropology from Utrecht University in 1995, and a Ph.D. degree in Social Science from VU University Amsterdam in 2005. He worked in over 35 countries worldwide: as 'hands-on' innovator and innovation manager with international responsibilities at Philips Electronics, as consultant and innovation manager at THT Intercultural Management Consulting (a KPMG company) and Innovation Culture & Change, as academic teacher and researcher at Utrecht University, VU University Amsterdam, Radboud University Nijmegen and University Leiden, and as director of business school NIMBAS. He is the author of four books, 25 book chapters and more than 50 articles in academic and professional publications. His current research interest is in developing corporate and regional cultures of innovation.

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