

# **New Waves in Innovation Management Research**

Edited by

**Marcus Tynnhammar**

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**Series in Innovation Studies**



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*In the Americas:*  
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1000 N West Street,  
Suite 1200, Wilmington,  
Delaware 19801  
United States

*In the rest of the world:*  
Vernon Press  
C/Sancti Espiritu 17,  
Malaga, 29006  
Spain

Series in Innovation Studies

Library of Congress Control Number: 2018948070

ISBN: 978-1-62273-434-4

Cover design by Vernon Press.

Cover image: designed by starline / Freepik.

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# Introduction

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The ISPIM Dissertation Award was launched in 2011 to recognize the prolific contribution that PhD dissertations make to the field of Innovation Management. With the generous support of Innovation Leaders (*a global research programme that identifies the world's most effective innovators*), three winners are selected from the 100+ entries every year and receive their award at the annual ISPIM Innovation Conference.

Through this publication, the 2018 ISPIM Dissertation Award casts its spotlight beyond the top three dissertations and onto a much greater number of top submissions that cover a broad range of topics. It illustrates the depth and breadth of the coming wave in innovation management research.

Articles in the first section explore the theme of **Collaboration**. "The Resilient Innovation Team" suggests how a team might handle "critical incidents" during their projects. Next "The Benefits of Trusted Bridging Chains for Open Innovation," illustrates how trust in the form of social capital plays a big part in shaping Open Innovation relationships. Continuing with the theme of Open Innovation, "An Analytical Approach to Assess the Matching Quality of Academic Partners for Open Innovation in the Form of University-Industry Collaboration" showcases how partners can be selected, in particular when the perfect match between academia and industry is rare. "Exploring inter-organizational collaboration for innovation in a regional ecosystem" is the fourth contribution and it also deals with inter-organizational collaboration but moves the lens to understand how SMEs might work together in regional ecosystems. The final article in the section: "The Contribution of Socially Driven Businesses and Innovations to Social Sustainability," puts collaboration in a social setting by examining the importance of socially-driven businesses for sustainable development.

The second section is on **Creativity**, and starts with "Awakening employee creativity in organizations," which shows the different ways to increase em-

ployee creativity, from both the employee and employer perspectives. Next, "Building Higher-Order Capabilities" shows that creativity is a crucial ingredient when pursuing big endeavors with limited resources. Another way to study creativity is to look at how innovation champions promote innovations within their organizations, and this is the focus of the third article in this section: "Investigating innovation champions in the non-profit sector." Next, "Design and Evaluation of a Process Model for the Early Stages of Product Innovation" shows how the early creative phase of development can be structured. The final contribution to the section, "Firm Responses to Disruptive Innovations," leads into the following section on Digitalization by looking at how firms need to be creative in their response to digital disruption.

**Digitalization** has really become a popular topic in Innovation Management. "A Framework for Accelerated Product Innovation in a Big Data Environment" deals with Big Data and its effect on new product development. "A Framework to Evaluate the Impact of ICT Usage on Collaborative Product Development Performance in Manufacturing Firms" refines the focus to the effects of Big Data on collaboration. One way to collaborate is through social media, and the contribution "The Effects of Procedural Knowledge Transparency on Adoption in Corporate Social Networks" shows how this can have an effect on knowledge sharing. Another new disruptive technology is electric cars, and the article "Technology Planning for Aligning Emerging Business Models and Regulatory Structures" shows how companies can adapt to fit within these types of disruptions. The section closes with "From gamestorming to mobile learning," which shows how business models are changing to fit with digitalization.

**Globalization** is a well-examined topic and the next section has examples from all over the world on how countries adapt and try to be competitive in the global arena. "Chinese Multinational Enterprises' R&D" explains how China is reaching out to the global market. Next, "The Impact of Strategic Alliances and Internal Knowledge Sources on the Manufacturing Firms' Innovation and on Their Financial Performance" continues the globalization theme by comparing Brazil and Europe in terms of financial performance. The contribution of "Reverse Innovation" is to look at globalization from the perspective of how multinationals might need a new innovation model to succeed globally. And finally, "Never venture, never win! The Chinese rush to innovation and regional development" brings us back to China for a look at how regional development is being encouraged as a path to innovation.

The **Management** section starts with "Innovation Management Systems," on how to manage for continuous performance improvements. A crucial part of idea management is the ability to think before you decide, which is dealt with in "First things first - think before you decide." Besides managing operations and similar aspects, there is also a need to handle consumer resistance,

which is explained in "Consumer Resistance to Innovations," which suggests how to overcome such resistance. Next, "Entrepreneurial opportunity perception" discusses the learning styles of entrepreneurs. The final section looks at management through a financial lens: "Antecedents and Consequences of Exploration and Exploitation Decisions" deals with venture capital investments and innovation.

The final section in this book has four contributions on **Technology Transfer**. It starts with "A Journey through University Technology Transfer," on how academia affects innovation beyond the academic sphere. "Processes and Ecosystems of Innovation" is next and sheds light on effective ecosystems and the application of nanotechnology. Another common area for technology transfer is Innovation Hubs, and in the second to last article, "Innovation Hubs in Africa," we learn more about how these hubs assist in helping entrepreneurs. The final contribution, "Exploring knowledge intensity in entrepreneurship," also deals with entrepreneurs by looking at the role of knowledge intensity.

This publication provides both a showcase of what the latest generation of scholars are contributing to innovation management's body of knowledge as well as an insight into what they find significant and what might become important for the field as a whole over time. Scholars from 20 countries from Europe, Asia, North America and Africa are represented.



# **The Resilient Innovation Team: a Study of Teams Coping with Critical Incidents during Innovation Projects**

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**Abstract:** Organising in a mindful way is key to helping innovation teams become more resilient and thereby increase the chances of innovation success. Organising in a mindful way, called 'mindful infrastructure,' implies creating the right conditions for teams to excel. To this end, four elements are crucial. When teams are 1) feeling psychologically safe, 2) experience a learning environment, 3) have a say in decision-making, and 4) see that leadership creates synergy, the foundation is laid for resilient team behavior. In turn, this 'team innovation resilience behavior' enables teams to successfully deal with critical incidents, which, otherwise, could lead to innovation failure. Resilient innovation teams are extremely alert to small things that can become big problems, hate to jump to conclusions, link management goals with operational practice, value expertise stronger than rank, and can radically change course if required. This helps them keep their innovation projects on track and thus improve the chances of innovation success. This study has sought to investigate the scientific underpinnings of mindful infrastructure and team innovation resilience behavior. In addition, it provides practical guidelines for building a Resilient Innovation Team.

**Keywords:** Innovation; teams; project management; resilience; mindfulness; HRO.

## **1. Introduction**

The study *The resilient innovation team: a study of teams coping with critical incidents during innovation projects* (Oeij 2017a) is rooted in the author's fascination about why so many innovations seem to fail (Sausser, Reilly and Shenhar, 2009). Innovations, in this study, are understood as new products, new services, new processes, or new working methods that are being developed in projects. Unlike other studies that explain reasons for innovation failure due to the role of markets, finance, technology, consumer demands and organizational developments, this study focuses on team behavior as a reason for innovation failure (Azim et al., 2010). The researcher's curiosity was driven by initial questions such as: do innovation projects fail because such

projects are complex? (Cicmil and Marshall, 2005). Do they fail because people in teams become defensive when there is tension, uncertainty and fear (Argyris, 2010) and become risk avoidant (Andriopoulos, Gotsi, Lewis and Ingram 2017)? Somewhere, outside the world of innovation management, there are teams that hardly ever fail. These are teams working in high-risk situations, namely teams in nuclear plants, on aircraft-carriers, in operating rooms, and in fire-brigades (Weick and Sutcliffe, 2007). Such teams are called HRO-teams after the High Reliability Organizations (HROs) that they are part of. HROs are studied in fields of safety and crisis management. Why do such teams hardly ever fail? Moreover, can innovation teams learn from HRO-teams? These questions led to the assumptions behind this study, namely, that knowledge from the field of safety and crisis management and their HRO-principles could be applied to the field of innovation management.

HRO-teams are characterized by the following: they are embedded in an organizational context that nourishes trust, learning, commitment and supportive leadership: a mindful infrastructure. Due to that context, particular team behavior is enabled that minimizes making mistakes and gets a team back on track should a mistake or accident occur. That type of team behavior is based on five HRO-principles (Weick and Sutcliffe, 2007), explained in Section 2. We mapped this team behavior to innovation teams and called it *innovation resilience behavior*. HRO-teams can minimize accidents and contain their escalation should they nonetheless occur: they have excellent team results. However, team results of innovation teams are different, namely achieving progress and positive results instead of the failure of innovations. Therefore, the research is directed at the applicability of HRO-principles in the context of innovation (management).

There are many reasons why projects and innovations fail or succeed, and there are several overviews of possible factors (Cooke-Davies, 2002; Han and Lorenz, 2015; Sauser, Reilly and Shenhar, 2009). Shenhar and Dvir (2007) argue that most people believe projects fail due to poor planning, a lack of communication, or inadequate resources, but the evidence suggests that failure is often found even in well-managed projects run by experienced managers and supported by highly regarded organizations. Projects are strongly affected by the dynamics of the environment, technology, or markets. That is why 'one size does not fit all,' and project success demands an adaptive approach to adjust the project to the environment, the task, and the goal (Shenhar and Dvir, 2007). Being able to adjust a project requires a shift of attention from only the 'hard factors' to including the 'soft factors.' Hard factors, such as the project management's iron triangle - the triple constraint of the criteria to complete the project on time, within budget and within performance goals or requirements - remain important, but soft factors, such as behavior, leadership, skills, communication, and organizational culture,

should not be ignored. The complexity of projects, where the small details of projects are inherently unpredictable, which can have serious consequences, is more often caused by people, than by a product or process, according to project managers (Azim, et al., 2010). Team behavior and the environment of teams, therefore, contain crucial leverage factors for both failure and success. This study has chosen specific aspects of team dynamics as its research topic to address the following theoretical gap and practitioner problem:

theoretical lacuna: this study applies insights from crisis and safety management within the field of innovations and their teams, which is somewhat novel. The gap is the absence of discussion about effective teamwork as developed within crisis and safety management in the innovation management literature; practitioner problems: although it is unclear how many innovations really 'fail' - definitions of failure vary - the reported average of 40% of product innovations is significant (Castellion and Markham, 2013). It seems clear that organizations have much to gain by improving the process of innovation in teams, acquiring a more profitable return on investments (ROI). This study intends to create knowledge that can help to reduce the percentage of failing innovation projects. Its main contribution is to develop a team context ('mindful infrastructure') and team behavior ('innovation resilience behavior') that foster intrapreneurship - acting like an entrepreneur within the organization - and risk taking, instead of playing safe and avoiding risky experiments which are so crucial for innovation.

## **2. Background and theory**

### **Why should innovation teams act as mindful and innovation resilient?**

There are four reasons why project teams in innovation should become capable of innovation resilience behavior and these reasons are interrelated. The first reason is that many projects and innovations are not successful (Castellion and Markham, 2013) and that greater success improves the competitiveness of organizations. The second reason is that higher alertness and resilience make teams more effective and efficient, analogous to HROs which make almost no mistakes (Alliger et al., 2015), and enable teams to recover from disappointing events such as project terminations (Todt, Weiss and Hoegl, 2017). The third reason is that organizations could make a challenging business case for higher success rates of innovation processes because it would not only save costs but improve their returns on investments more often, and faster (Castellion, 2013). The fourth reason is that there is suggestive evidence that organizational mindfulness is associated with a greater

number of patents, as an indicator of innovation (Vogus and Welbourne, 2003). These reasons suggest a sense of urgency for agents in the innovation management domain to act.

HROs invest in mindful working because it makes them more reliable; to them safety is more important than economic goals. Investing in HRO-principles is also beneficial for non-HROs, however. For non-HRO's striving for innovation thru organizational learning is a key factor, as safety is for HROs. These non-HROs do not invest in safety, but in organizational learning. Weick, Sutcliffe and Obstfeld (1999) plausibly suggest that learning capabilities enhance innovative capabilities, trust, motivation, collaboration and communication, and thus favor non-HROs. Teams nowadays are ubiquitous in the working world; many teams face challenges that can drain resources, adversely affect performance, and diminish team cohesion and team member well-being (Alliger et al., 2015).

### **The relevance of the crisis management and safety literature for innovation management**

High-Reliability Organizations include power grid dispatching centers, air traffic control systems, nuclear aircraft carriers, nuclear power generating plants, hospital emergency departments, wildland firefighting crews, aircraft operators, and accident investigation teams. They operate "under very trying conditions all the time and yet manage to have fewer than their fair share of accidents" (Weick and Sutcliffe, 2007: pp. 17-18). According to Weick and colleagues (1999; 2007), the reason for this reliability is that these organizations have the characteristics of "mindful organizations." Five characteristics of mindful organization constitute a collective state of mindfulness. The attractiveness of HROs as a model or ideal type is that any organization can be measured against them (Hopkins, 2014). Despite some very good examples of HROs, there is no authoritative, systematic, representative and quantitative evaluation of HROs that provides compelling scientific evidence why HROs operate safely and how they manage to do so (Lekka, 2011). The best evidence of HROs to minimize accidents and mistakes comes from the many but scattered studied cases. Weick and colleagues (1999) analyzed these studies and drew general conclusions about HROs that count as an authoritative analysis (Hopkins, 2014).

### **The five HRO-principles**

The HRO-principles have a psychological basis in the motivation to pursue cognitive effort in order to detect errors and act upon them, adapting the situation to effectively deal with (possible) errors. In this sense reliability refers to the stability of cognitive processes. The motivation to continually be

aware of unforeseen situations leads to stable cognitive processes with which to detect possible errors, and to a variable pattern of activities to adapt to events which require revision. This stability of cognitive processes ensures continuous learning from events that unfold in slightly different ways each time, and that eventually results in reliability (Weick et al., 1999: pp. 86-88).

Weick and colleagues then relate stable cognitive processes to effective error detection in five areas of concern. These five concerns are tied together by their joint ability to induce a rich awareness of discriminatory detail and a capacity for action, which the authors call 'mindfulness' (Weick et al., 1999: pp. 88-90). A successful HRO is an organization characterized by the absence of failures and errors through maximizing its reliability, by applying these five principles.

1. Preoccupation with failure involves learning from events that seldom occur and to converting them into grounds for improvement (being alert to weak signals).
2. Reluctance to simplify involves restricting simplification in interpretations to increase the number of precautions and minimize surprises.
3. Sensitivity to operations involves perceiving the integrated big picture of operations in the moment, at a higher level than operational level, and comprising the collective mind beyond the individual operator. There must be an unambiguous relationship and alignment between the actions at shop floor level and management level.
4. Commitment to resilience involves anticipation and resilience. Anticipation is the prediction and prevention of potential dangers before damage is done, whereas resilience is the capacity to cope with unanticipated dangers after they have become manifest and learning to bounce back. Resilience is the ability to not only bounce back from errors, but also to cope with surprises in the moment, and to respond as they occur.
5. Under-specification of structures refers to loosening the designation of the 'important' decision maker in order to allow decision making to migrate with problems. Weick and Sutcliffe (2007) later renamed this as 'deference to expertise': it is not the highest rank that makes decisions, but the person who is most expert.

### Scientific evidence or entrepreneurial gut?

It was noted above that projects and product innovations have a substantial failure rate (Castellion and Markham, 2013). Castellion and Markham argue that the failure rate of new products can be whatever management tolerates, therefore the urgency to prevent failure is a business case: for HROs it is being reliable and safe; for businesses it is being profitable and competitive. Thus, there is the issue of whether HRO-thinking is suitable for non-HROs, which has not been much researched in the context of innovation and team dynamics. The evidence of HRO-principles in organizational performance is limited and context-specific. Paradoxically, the delivery of energy and electricity from a nuclear power plant, for example, is its primary production goal, and can at times be made subordinate to the safety of lives and the environment. Maximising reliability to maximize safety comes with an investment in mindful organizing, such as investing in training and facilitating the five key principles. For HROs, making the trade-off between investing in these resources and running the risk of failure is clear-cut: safety pays off.

For non-HROs, the trade-offs may be not as clear when the investments are high (Rousseau, 1989). The development of the five HRO-principles requires high investment in the selection and training of staff competences, and in organizational 'slack' to create space for maneuvering, all for the sake of safety. Not only are they a huge investment, but the evidence that HRO-principles are working is also merely suggestive, and the literature lacks convincing direct tests of whether, and through which mechanisms, genuine and emulating (i.e., hospitals) HROs enhance reliability (Lekka, 2011; Vogus and Iacobucci, 2016). Investing in HRO-principles remains a management choice, presumably based more on entrepreneurial guts than scientific fact. Weick and Sutcliffe (2007), are of the opinion that HRO-principles require a sense of urgency for non-HROs as well, not to invest in safety, but in (organizational) learning. Having said that, HRO-principles are thus far not investigated in relation to team behavior in innovation projects. To connect HRO-thinking about safety- and crisis management to innovation management and project teams, we developed a conceptual model that explains how innovation resilience behavior - a transfer of HRO-principles to the context of innovation - can emerge. Mindful infrastructure must be present to enable Team IRB. Figure 1.1 depicts the model in a simple format.



**Figure 1.1** Framework of the research.

The **central question** of the study is: *How do project teams deal with critical incidents during their innovation projects?*

A critical incident is an event or situation that could cause a project to fail. What do these teams do in their projects when they encounter such critical incidents? And what characteristics do such teams have? Are these teams embedded in a mindful infrastructure (Vogus and Sutcliffe, 2012)? To investigate this, the study considers the presence of team psychological safety, team learning behavior (Edmondson, 1999), team voice (LePine and Van Dyne, 2001) and complexity leadership (Lawrence, Lenk and Quinn, 2009) that together constitute mindful infrastructure. These are the research variables mapping on the above-mentioned concepts of trust, learning, commitment and supportive leadership. Do teams exhibit innovation resilience behavior (Team IRB)? To investigate this, the study assesses the presence of the five HRO-principles that were modified by team behavior in innovation teams.

The **overall hypothesis** of the PhD thesis is that mindful infrastructure enables Team IRB, and that Team IRB has positive effects on project outcomes. The main question is divided into seven research questions:

1. What is mindful infrastructure and what is Team IRB? What is their relationship?
2. Does IRB affect perceived project results and perceived project progress?
3. Do teams have different configurations of mindful infrastructure?
4. Is IRB associated with defensive behaviors?
5. How do project leaders manage innovation projects?
6. How do teams respond to critical incidents during innovation projects?
7. What can innovation management teams learn from HRO teams?

### 3. Research design

The research took place among eleven Netherlands-based organizations, some of them are multi-nationals. These organizations are selected from the manufacturing sector, services and education; some are profit organizations, others are non-profit organizations. In these eleven organizations, eighteen teams and their innovation projects are studied as cases studies, and addi-

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# Acronyms

ABM	Architectural BM
AMO	Ability-Motivation-Opportunity
AUTM	Association of University Technology Managers
BTF	Behavioral Theory of the Firm
BM	Business Model
BMC	Business Model Canvas
BMF	Business Model for a flourishing future
CEO	Chief Executive Officer
CFAT	Carnegie Foundation for the Advancement of Teaching
CPD	Collaborative Product Development
CSN	Corporate Social Network
CSR	Corporate Social Responsibility
CVC	Corporate Venture Capital
DS	Design Science
DSRM	Design Science Research Methodology
FDI	Foreign Direct Investment
FEI	Front End of Innovation
FP	Financial Performance
fsQCA	fuzzy set Qualitative Comparative Analysis
GDP	Gross domestic product
GEE	Generalized Estimating Equations
HRM	Human Resource Management
HRO	High Reliability Organisations
IAOIP	International Association of Innovation Professionals
IB	International Business
ICT	Information and Communication Technology
IMS	Ideas and Innovation Management Systems
IP	Innovation Performance
IPO	Intellectual Property Office
IR	Investor Relations
IRB	Innovation Resilient Behavior
IWB	Innovative Work Behaviors
KET	Key Enabling Technology
KIE	Knowledge Intensive Entrepreneurship
KM	Knowledge Management
LDA	Latent Dirichlet Allocation
LDC	Least Developed Countries

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LGT	Local Growth Teams
LLL	Linkage-Leverage-Learning
MBA	Master of Business Administration
MIT	Massachusetts Institute of Technology
MNC	Multinational corporation
MNE	Multinational Enterprises
NACE	Nomenclature of Economic Activities
NPD	New Product Development
OECD	The Organisation for Economic Co-operation and Development
OI	Open Innovation
OIPT	Organizational Information Processing Theory
PhD	Philosophiae doctor, Doctor of Philosophy
PKT	Procedural Knowledge Transparency
QCA	Qualitative Content Analysis
R&D	Research and Development
RIO	Research Innovation Office
ROI	Return Of Investment
RRBV	Relational Resource-Based View
SAIMM	Southern African Institute of Mining and Metallurgy
SHP	Small Hydro Power
SDT	Self-Determination Theory
SDU	Sustainable Development Unit
SEM	Structural Equation Modelling
SLR	Systematic Literature Review
SSM	Soft Systems Methodology
TRL	Technological Readiness Levels
TTO	Technology Transfer Office
UIC	University Industry collaboration
UTTO	University Technology Transfer Officer
VBM	Value Business Model

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