



Aalborg Universitet

AALBORG UNIVERSITY
DENMARK

Development of an Innovation Process for Managing Employee-driven Innovation
in a governmental client organisation within the Danish construction industry

Sørensen, Henrik

DOI (link to publication from Publisher):
[10.5278/VBN.PHD.ENGSCI.00082](https://doi.org/10.5278/VBN.PHD.ENGSCI.00082)

Publication date:
2015

Document Version
Publisher's PDF, also known as Version of record

[Link to publication from Aalborg University](#)

Citation for published version (APA):
Sørensen, H. (2015). *Development of an Innovation Process for Managing Employee-driven Innovation: in a governmental client organisation within the Danish construction industry*. Aalborg Universitetsforlag.
<https://doi.org/10.5278/VBN.PHD.ENGSCI.00082>

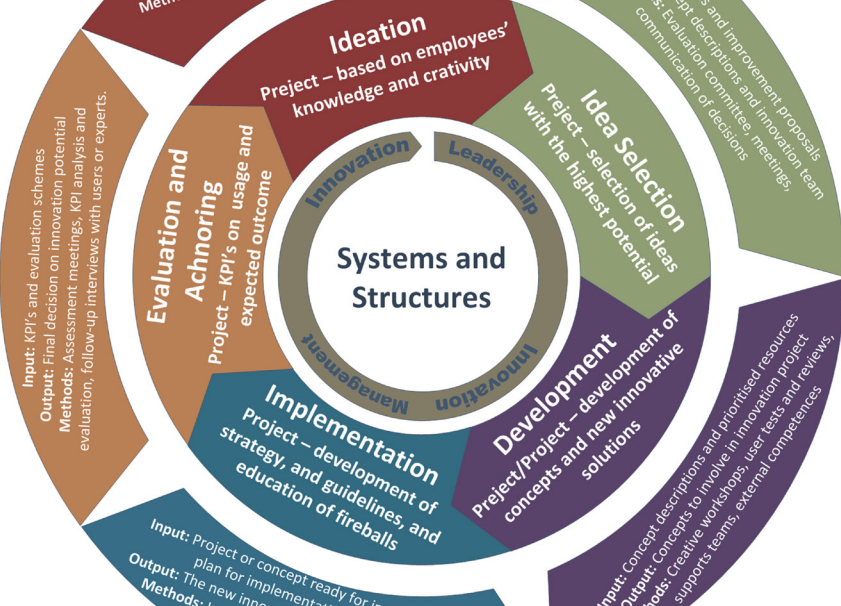
General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal -

Take down policy

If you believe that this document breaches copyright please contact us at vbn@aub.aau.dk providing details, and we will remove access to the work immediately and investigate your claim.



DEVELOPMENT OF AN INNOVATION PROCESS FOR MANAGING EMPLOYEE- DRIVEN INNOVATION

- IN A GOVERNMENTAL CLIENT ORGANISATION WITHIN THE
DANISH CONSTRUCTION INDUSTRY

BY
HENRIK SØRENSEN

DISSERTATION SUBMITTED 2015



AALBORG UNIVERSITY
DENMARK

DEVELOPMENT OF AN INNOVATION PROCESS FOR MANAGING EMPLOYEE-DRIVEN INNOVATION

**- IN A GOVERNMENTAL CLIENT ORGANISATION WITHIN
THE DANISH CONSTRUCTION INDUSTRY**

by

Henrik Sørensen



AALBORG UNIVERSITY
DENMARK

30th of March 2015

Thesis submitted: 30th of March 2015

PhD supervisors: Associate Prof. LENE FABER USSING,
Aalborg University
Senior Associate Prof. SØREN WANDAHL,
Aarhus University

Assistant PhD supervisor: Project Manager, PhD, RANDI MUFF
CHRISTENSEN, COWI A/S

PhD committee: Associate Prof. (Chairman), FRANK GERTSEN,
Aalborg University
Prof. CHRISTINE PASQUIRE, Nottingham Trent
University
PhD, MSc. in Engineering LENNIE CLAUSEN,
Real Dania

PhD Series: The Faculty of Engineering and Science, Aalborg
University

ISSN (online): 2246-1248
ISBN (online): 978-87-7112-267-1

Published by:
Aalborg University Press
Skjernvej 4A, 2nd floor
DK – 9220 Aalborg Ø
Phone: +45 99407140
aauf@forlag.aau.dk
forlag.aau.dk

© Copyright: Henrik Sørensen

Printed in Denmark by Rosendahls, 2015



CV

EDUCATION

- 2007-2009 Master of Science (MSc) in Engineering and Construction Management.
- 2004-2007 Bachelor degree (BSc) in Engineering and construction

PROFESSIONAL EXPERIENCE

- 2015- Project Manager in the project and construction department at the Danish Defence Estates & Infrastructure Organisation
- 2012-2015 Project Manager/industrial PhD in the R&D-department at the Danish Defence Estates & Infrastructure Organisation
- 2011-2012 Project worker/leader in the R&D-department at the Danish Defence Estates & Infrastructure Organisation
- 2010-2011 Research Assistant at Center for Industrial Production, Aalborg University, on a project on user-driven innovation

LIST OF PUBLICATIONS

2015 – Submitted

Sorensen, H., Wandahl, S. Ussing, L. F., Christensen, R. M. (2015) *Perspectives on an Innovation Process for Employee-driven Innovation – an expert review*, In: International Journal of Innovation Management

Sorensen, H., Wandahl, S. Ussing, L. F., Christensen, R. M. (2015) *Identification of determinants for supporting innovation in client organisations – a case study*, In: Management Decision

2014

Sorensen, H., Wandahl, S. & Christensen, R. M. (2014) *Employee-driven innovation in large project organisations*. LARYEA, PROF SAMUEL & IBEM, DR EZIYI, eds. PROCEEDINGS OF THE 8th cidb POSTGRADUATE CONFERENCE, 2014, School of Construction Economics and Management University of the Witwatersrand, University of the Witwatersrand, Johannesburg, South Africa, 269-280.

2013

Sorensen, H. & Wandahl, S. (2013) *Employee-driven innovation: A brave new world in the build environment's project organisations* IPGRC 2013 - 11th International Postgraduate Research Conference, 2013, International Council for Research and Innovation in Building and Construction, Manchester, UK.

2012

Sorensen, H. & Wandahl, S. (2012) *Drivers and obstacles for employee-driven innovation in large client project organizations*, COBRA 2012, Proceedings of the Construction, Building and Real Estate Conference 2012, 337-345, Construction, Building and Real Estate Conference, Las Vegas, USA. ISBN: 978-1-84219-840-7

2011

Wandahl, S., Cankaya, A., Lassen, A. H., Poulsen, S. B. & Sørensen, H. (2011) *User-driven Innovation in a Construction Material Supply Network*, In: Construction Innovation, 11 (4), 399-415.

Lassen, Astrid Heidemann; Jacobsen, Alexia; Wandahl, Søren; Poulsen, Søren Bolvig; Sørensen, Henrik. (2011) *User-driven innovation in Supply and Value Networks: Development of a Framework for Evaluation of Implementation readiness*, Continuous Innovation: Doing More with Less. Continuous Innovation Network (CINet), ISBN: 978-90-77360-00-2

Lassen, Astrid Heidemann; Cankaya, Alev; Poulsen, Søren Bolvig; Wandahl, Søren; Sørensen, Henrik. (2011) *InnoDoors – Modellen*, 1 udg. Aalborg : Center for Industriel Produktion, Aalborg Universitet, 2011. 59 p.

Wandahl, S., Cankaya, A., Sørensen, H., Poulsen, S. B. & Lassen, A. H. (2011) *Brugerværdier - Fra idégenerering til konkretisering*, 1. udg. Aalborg: Center for Industriel Produktion, Aalborg Universitet. ISBN: 987-87-91831-38-6

Sørensen, Henrik; Lassen, Astrid Heidemann; Gorm Hansen, Katrine; Poulsen, Søren Bolvig; Jacobsen, Alexia; Wandahl, Søren. (2011) *Online Communities*, Center for Industriel Produktion: Projekt InnoDoors at Center for Industriel Produktion, Aalborg Universitet, 27 s.

Lassen, A. H., Cankaya, A., Poulsen, S. B., Wandahl, S. & Sørensen, H. (2011) *InnoDoors - Modellen*, 1. udg. Aalborg: Center for Industriel Produktion, Aalborg Universitet. 59 s. ISBN: 978-87-91831-33-1

2010

Lassen, A.H., Poulsen, S.B., Wandahl, S., Cankaya, A and Sørensen, H. (2010). *Brugersegmentering – Fra kundefokus til brugerfokus*, 1. udg. Aalborg: Center for Industriel Produktion, Aalborg Universitet. ISBN: 978-87-91831-31-7

Lassen, A.H., Poulsen, S.B., Wandahl, S., Cankaya, A and Sørensen, H. (2010). *Slutbrugerens værdier*, 1. udg. Aalborg: Center for Industriel Produktion, Aalborg Universitet. ISBN: 978-87-91831-30-0

Lassen, A.H., Poulsen, S.B., Wandahl, S., Cankaya, A and Sørensen, H. (2010). *Dørens rejse del 2 – Udfordringer for innovation - fra leverandør til slutbruger*, 1. udg. Aalborg: Center for Industriel Produktion, Aalborg Universitet. ISBN: 978-87-91831-28-7

Lassen, A.H., Poulsen, S.B., Wandahl, S., Cankaya, A and Sørensen, H. (2010). *InnoDoors - Værdikæden*, 1. udg. Aalborg: Center for Industriel Produktion, Aalborg Universitet. ISBN: 978-87-91831-29-4

Lassen, A.H., Poulsen, S.B., Wandahl, S., Cankaya, A and Sørensen, H. (2010). *Dørens Rejse del 1 – Behovet for Innovation i Byggematerialeindustrien*, 1. udg. Aalborg: Center for Industriel Produktion, Aalborg Universitet. ISBN: 978-87-91831-27-0

ENGLISH SUMMARY

This research was conducted as an industrial PhD, where the PhD student was employed as a parttime researcher within the case organisation. The case organisation was a large governmental client organisation, organised as a project based organisation, operating within the construction industry. This thesis was conducted as a paper-based version, based on six papers, cf. appendix B.

The construction industry is, in many countries, considered to be slow in adopting new technologies and processes, thus, in general it is not regarded as an innovative industry. Instead a focusing is on short-term gains, instead of longer term planning of development and innovation. In the large project based organisations, which often operate within the construction industry, where the projects often are based on new bonds, the employees are an important and effective source to innovation that often are ignored or unseen in innovative approaches. In terms of their experienced-based and up-to date knowledge about the projects and the problem-solving processes, the employees' often possess the newest and most valuable knowledge regarding materials, markets, customers, processes and users. Thus, a methodology to implicate the spoken and tacit knowledge of these employees in the development of new tools and structures to optimise the product or processes in the construction industry is a relatively new approach used to engage innovation. One of the most recent (but still not a well documented field of research) in the general innovation literature is Employee-driven Innovation (EDI). EDI is often seen in a greater innovation context, in which it is often de-emphasised contrary to product and process innovation.

The main topic of this research was the development of an innovation process model driven by employees' ideas and knowledge. The key areas of interest were: Firstly, innovation management in larger project based organisations, with a focus on identifying the mechanisms that create innovation through organising, leading, coordinating and motivating the employees, secondly, the design of an innovative process model to ensure that the employees' ideas are transformed to improvements and innovations.

The findings were based on a case study on a unique case in relation to innovation. The originality was based upon the fact that the case organisation both was a public or governmental organisation, had a bureaucratic and hieratical project based organisational structure, had relatively highly skilled employees, and was operating within the construction industry. All of these aspects affected the conditions of the employees to drive the innovation, thus, they all had to be accounted for in the design of an EDI process model, applicable to the case organisation.

The research was initiated by exploring both the case organisation's innovative capabilities and the theoretical perspectives of the research topic. Firstly, a pre-study of semi-structured interviews to identify the innovation capabilities of the organisation were conducted, secondly, a systematic literature study to generate a body of knowledge was carried out, both in order to design the case study approach. The participants in the case study were groups of employees and managers, and the case study was designed as a gaming approach of discussing drivers and obstacles for conduction of EDI within the case organisational settings. The innovation process model was designed based on analysing the existing theory on EDI, from the literature study, and from the findings gathered through the semi-structured interviews, and through the case study conducted within the organisation.

The specific mechanisms identified through the case study research, which in particular were important to conduct EDI in a governmental client organisation, were: 1) *Mechanisms on leading the changes and taking ownership*, the roles of management and employees need to be defined explicitly. 2) *Evaluation and decision-making mechanisms*, the transparency in the decision-making process and the participating role of employees were important elements of this mechanism. 3) *Fast implementation and use of new innovations*, when the innovation process reaches the implementation and anchoring phases, the process needs to proceed rapidly, to keep the news value and 'platform burning'. 4) *Organisational practices* in terms of defining the innovative work-behaviour and ensuring trust in both the organisation and the innovation process. 5) *Recognition and rewards* in terms of motivating and stimulating the employees, the latter further elaborated in terms of a 6) *Financial of compensational incentive design*. It was found that financial or salary rewards potentially could be counter-productive, and as such should be designed and applied carefully.

Through this research it was discovered that the development of an applicable EDI process model provides methods and tools to increase the level of knowledge-sharing by planning and articulating formal and informal activities, which further adds to the stimulation of creativity, and the involvement of the employees. The new insights that further added to the academic field of research were identifying some specific mechanisms of innovation that should be integrated in the innovation process, both to motivate and stimulate employees to engage in innovative activities, and to enhance the applicability of an innovation process model in the case organisational settings.

DANSK RESUME

Denne ph.d.-forskning er gennemført som et industriph.d.-samarbejde mellem Forsvarsministeriets Ejendomsstyrelse og forskningsgruppen Byggeledelse under Institut for Mekanik og Produktion på Aalborg Universitet. Case organisationen, Forsvarsministeriets Ejendomsstyrelse, er en statslig bygherre, med en projekt-baseret organisatorisk opbygning, og som primært opererer i den danske byggebranche.

I mange lande opfattes byggeindustrien som værende en konservativ branche, der er meget modholdende overfor at implementere og udnytte nye værktøjet og processer. Man kan sige, at der i byggeindustrien generelt er meget fokus på kortsigtede gevinster, frem for den langsigtede planlægning, og at den heraf ikke opfattes som værende en industri med fokus på innovation og udvikling. I de større projektbaserede organisationer i byggeindustrien, som styres af nye og skiftende projekter, der er ofte baseres på nye koblinger og relationer, kan medarbejderne betragtes om en vigtig og effektiv kilde til innovation, som ofte bliver overset i innovationssammenhæng, frem for fokus på andre innovationstyper, så som produkt-, proces-, og teknologiinnovation. Medarbejdernes erfaringer og 'up-to date' viden om omkring projekter og opgaveløsning, betyder at den nyeste og mest værdifulde viden om en organisations produkter, processer, kunder, markeder etc. ofte ligger hos netop medarbejderne, hvoraf deres betydning ift. innovation understreges. En model til at udnytte medarbejdernes tavse og udtalte viden samt erfaringer i en innovationssammenhæng, kan således betragtes som en forholdsvist ny tilgang til innovation. Et af de nyere og stadig ikke fuldt ud dokumenterede forskningsområder i og omkring innovation er medarbejderdrevet innovation (MDI). MDI bliver ofte betragtet i en større innovationskontekst, hvor det ofte nedprioriteres til fordel for de mere anerkendte og gennemprøvede innovations-tilgange.

Hovedtemaet for dette forskningsprojekt var udvikling af en model til skabe innovation drevet af medarbejdernes viden og ideer. Der var specielt fokus på områderne: Innovationsledelse i større projektbaserede organisationer, hvor det primære formål var at identificere og udvikle de mekanismer, der kan skabe innovation gennem organisering, ledelse, koordinering og motivation af medarbejderne. Samt på udvikling og design af en innovationsmodel til at sikre, at medarbejdernes viden og ideer bliver omdannet til løbende forbedringer og innovation.

Resultaterne af denne forskning var primært baseret på et case studie af en forholdsvist unik case. Originaliteten består i det omfang, at case organisationen er både påvirket af politiske og offentlige meninger og tendenser, den har en

bureaukratisk og hierarkisk projekt baseret organisatorisk opbygning, den har relativt højtuddannede medarbejdere, samt at den operer i en konservativ industri som byggeindustrien. Alle disse aspekter påvirker vilkårsrummet for at arbejde med innovation drevet af medarbejderne, hvilket der skal på et eller andet niveau tages højde for i designet af en innovationsmodel til MDI, for at øge potentialet og anvendeligheden i case organisationen.

Forskningsprocessen blev indledt med et eksplorativt studie af først organisationen generelle innovationsevne og derefter de teoretiske perspektiver i den videnskabelige litteratur. Organisationens innovationsevne blev udforsket gennem semi-strukturerede interviews med udvalgte medarbejder i organisationen, og den videnskabelige litteratur blev undersøgt gennem et systematisk litteraturstudium, begge dele for at give input til at designe det større case studie. Case studiet var designet med en spil- og/eller konkurrencetilgang, hvor deltagerne skulle udfordre hinandens idéer og svar til mulige 'drivers' eller udfordringer, i forbindelse med at arbejde med MDI i case organisationen. Deltagerne i case studiet var udvalgte grupper af medarbejdere og ledelsen.

Innovationsmodellen for at arbejde med MDI i case organisationen blev designet på baggrund af en analyse af den eksisterende videnskabelige litteratur på området, samt på baggrund af en analyse af resultaterne fra de semi-strukturerede interview, fra case studiet, og fra feedback fra et ekspertpanel, som lavede et review af de første modeludkast. De specifikke mekanismer for at drive innovation, der blev identificeret og som innovationsmodellen er bygget op omkring var: 1) *Lede forandringer og tage ejerskab*, både ledelsens og medarbejdernes roller skal være klart definerede. 2) *Evaluering af beslutningstagning*, der skal være gennemsigtighed i både den overordnede beslutningsproces, samt i medarbejdernes rolle i heri. 3) *Hurtig implementering og ibrugtagning*, implementerings- og forankringsprocessen samt ibrugtagning skal gennemføres hurtigt for at sikre, at nyhedsværdien stadig skaber opmærksomhed, og at der stadig er en 'brændende platform' i organisationen. 4) *Organisatorisk praksis*, ift. at definere den ønskede innovationsadfærd samt at sikre tillid blandt medarbejderne ift. både organisationen generelt og innovationsprocessen. 5) *Anerkendelse og belønning*, til at stimulere og motivere medarbejderne til at engagere sig i innovative aktiviteter. I forbindelse med belønning er en 6) *Finansiel eller kompensations incitament struktur*, er en vigtig parameter, da penge i sig selv kan virke mod hensigten, denne mekanisme skal således være gennemtænkt og anvendes med omtanke.

Igennem forskningen blev det klart, at udviklingen af en anvendelig innovationsmodel, der er tilpasset en organisation, kan give både metoder og værktøjer til at øge niveauet af videndeling gennem planlægning og italesættelse af formelle og uformelle videndelings aktiviteter. Dette vil samtidig påvirke kreativiteten og lysten til at deltage i udviklings- og innovationsaktiviteter blandt medarbejderne. Samtidig gav forskningen et bidrag til det akademiske felt omkring

MDI, ift. at identificere og videreudvikle nogle specifikke mekanismer, som var essentielle i de rammer som case organisationen arbejder i. Disse mekanismer bidrog således til at en innovationsmodel, der motiverer medarbejderne til at engagere sig i innovation og innovationsrelaterede aktiviteter, og som samtidig er lettere implementerbar og mere anvendelig.

ACKNOWLEDGEMENTS

This research was conducted in collaboration with the Construction Management group at the Department of Mechanical & Manufacturing Engineering at Aalborg University and the Danish Defence Estates & Infrastructure Organisation. There are a number of people, who have been involved in making this PhD research possible, and who I owe a special thanks to:

First and foremost a special thanks to the management at Danish Defence Estates & Infrastructure Organisation, where Helle Løkke and Torben Gade were my primary sponsors. Without their willingness to employ me as an industrial PhD, and allowing me to spend time on this research, which was in the periphery of the general assignments in the organisation, this PhD would never have been initiated.

To my supervisors Lene Faber, Randi M. Christensen and Søren Wandahl, where Lene has been the main co-ordinator between me and AAU, Randi has been ensuring the interest between case organisation and the research, and also had a huge impact in starting up this PhD, and Søren who played a major part in forming this PhD, and has been acting as the main supervisor, asking all the academic questions, and contributing to more or less all of the research conducted, ensuring that I always got back on track, when the theory-development got out of control.

To my colleagues, friends and family, who have been listening to all my good ideas, and arguments as to, why innovation is so important. A special thank should go to my girl-friend Anne, for supporting and putting up with me, particularly in the last few months of the PhD, where the work has been quite intensive, and to my little son for ensuring that I got up early every morning, and ‘helped’ me tapping the keyboard.

Last, but not least, I would like to give a special thanks to all of the employees from the Building division within the Danish Defence Estates & Infrastructure Organisation, who have participated in the semi-structured interviews and in the case study gaming approach, for taking their time to contribute to my research, and to the experts, who were involved in reviewing some of my findings, and who gave both academic and also more practical comments and perspectives the findings, and for further research. Without all of your contributions, it would not have been possible to complete this research. A huge “thank you” should also be directed towards my English colleague, my only true lad, and my partner in crime in football discussion on Manchester United’s fall and rise, Paul Waters, for taking time to correct my thesis for English grammar and understanding in general.

Enjoy the reading.

TABLE OF CONTENTS

Chapter 1. Introduction.....	15
1.1. Background and motivation	15
1.2. The case organisation	17
1.3. Research problem.....	18
1.4. Hypothesis and research questions.....	19
1.4.1. Definitions and clarifications	20
1.5. Outline and thesis structure.....	21
Chapter 2. Research Design	23
2.1. Scientific paradigm	23
2.1.1. Ontology.....	24
2.1.2. Epistemology	24
2.1.3. Methodology	25
2.2. Research design.....	26
Chapter 3. Development of an EDI process Model	31
3.1. Innovation capabilities	31
3.1.1. Introduction.....	31
3.1.2. Perspectives on innovation capabilities.....	32
3.1.3. Partial conclusion	33
3.2. Theoretical landscape of employee-driven innovation.....	34
3.2.1. Introduction	34
3.2.2. The Process of the literature study	35
3.2.3. The theoretical landscape of EDI	36
3.2.4. Partial conclusion	36
3.3. Determinants for supporting Employee-Driven Innovation.....	37
3.3.1. Introduction.....	37
3.3.2. The gaming approach	38
3.3.3. Themes and determinants for conducting EDI	40
3.3.4. Partial conclusion	42
3.4. Development of innovation framework	43

3.4.1. Introduction.....	43
3.4.2. Framework for Employee-driven Innovation.....	44
3.4.3. Partial conclusion.....	46
3.5. Expert reviews of the EDI framework.....	46
3.5.1. Introduction.....	46
3.5.2. Findings.....	47
3.5.3. Partial conclusion.....	48
3.6. Mechanisams for Employee-Driven Innovation.....	49
3.6.1. Introduction.....	49
3.6.2. Method.....	50
3.6.3. Findings.....	50
3.6.4. Partial conclusion.....	53
3.7. An innovation process model for Employee-Driven Innovation.....	54
3.7.1. Introduction.....	54
3.7.2. Innovation process model for EDI.....	54
3.7.3. Partial conclusion.....	56
Chapter 4. Conclusion and Perspectives.....	59
References.....	63
Appendices.....	67

CHAPTER 1. INTRODUCTION

In this chapter the background and motivation for the research, and the case organisations that was the point of departure are presented. Furthermore, the research problem and related hypothesis are outlined, together with the thesis structure, including the dividing of the main thesis and the appendices.

1.1. BACKGROUND AND MOTIVATION

Innovation is no longer only a task for specialist and R&D departments, therefore involving the employees and the workforce, and utilising their innovative potential is considered to be a huge asset in gaining competitive advantages (Dorenbosch et al., 2005). According to de Sousa et al. (2012), more than 80 percent of every innovation produced today is generated from smaller incremental innovations, hence a huge potential lies in the smaller innovative steps that are often generated from the creativity of the workforce when existing products, processes or services are optimised or reinvented. Hamel (2006) also emphasises that more competitive advantages are developed from non-technological innovation, compared to the innovation developed from technology and laboratories. Hamel (2006), further quotes examples on how to link management and innovation in large project organisations, by focusing on employees and management, and on how to create innovation through organising, leading, coordinating and motivating the employees.

In large project organisations that are based on new bonds and relations in drifting systems (S. Christensen & Kreiner, 1991), the employees are an important, and effective source of innovation that are often ignored or unseen in innovative approaches. In terms of their experienced-based and up-to date knowledge about projects, the employees' often possesses the latest and most valuable knowledge regarding materials, markets, customers, processes and the users.¹ Hence, it's an obvious source of information and knowledge within the organisation, who can share their practical experiences and know-how in informal networks or forums (Høyrup, 2010). In project-led organisations within the construction industry the product and process knowledge are often closely related to, but irregularly driven by, individual employees. This aforementioned knowledge is often very difficult to identify, hence, it is also difficult to collect, share and utilise this knowledge inter-disciplinarily within the organisation. This approach requires a systematic structure

¹ LO 2008 (seen 2012). “*Employee-driven Innovation: Improving economic performance and job satisfaction*”.

or methodology such as Employee-driven Innovation (EDI), which features tools for managing structure, culture and methods in project organisations.

Involvement of employees has been a research topic for some years, but it has never really been formalised in terms of a theoretical or practical framework (Bakker & Demerouti, 2008). Hence, a methodology to implicate the spoken and tacit knowledge of the employees in development of new tools and structures in order to optimise the project processes in the construction industry is a relatively new approach to engage innovation. According to Kesting and Ulhøi (2010), surveys suggest that companies, who involve the employees in the innovation process, are far better off in developing new products and services, than companies that do not. EDI is not a well documented field of research within the field of general innovation literature, EDI is often seen in the greater innovation context, in which it is often de-emphasised, contrary to product and process innovation (Høyrup, 2010).

EDI can create job satisfaction and be a strong motivator for the participants in development projects, as they feel involved (Onarheim & Christensen, 2012). Motivation of knowledge employees can be accomplished by the presence of the correct antecedents, based upon the assumption that if employees find the antecedent exciting, they get motivated. Likewise allowing for autonomous work stimulates employees to develop, refine, and test new ideas, as they receive more responsibility in the projects, and thus also receive more recognition on the project success (Hartmann, 2006). Amar (2004) emphasise three sources of motivation or areas, from where motivation can emerge, these being; job mechanisms (job character), the outcome mechanisms (rewards, punishment) and the organisational system mechanism (policies, practices, culture).

Organisations, who decide to focus on innovation as a part of the culture and to pursue competitive advantages, have to be aware of that it is a comprehensive process of change. Organisations implementing innovative approaches just for the sake of innovation and branding can be damaging (de Sousa et al., 2012). It is often considered the easy part to get ideas and complete brainstorming activities, since ideation and creativity often grow with and origins from individuals. Organisations that do not have formal practices regarding knowledge-sharing often fail to exploit and develop their employees' intellectual capital in innovation and organisational growth (Bonnie & Monica, 2007). The challenging part of innovation is to develop and implement a system to turn creativity into a profitable business (de Sousa et al., 2012). For an organisation to innovative it requires a balance between play and discipline, practice and process, and creativity and efficiency. Hence the upper management must define the right balance on at least three levels; within the innovative process, between the primary functions within the organisation, and in the overall approach to corporate management (Leavy, 2005). By highlighting the importance of innovation and defining the innovative behaviour in an innovation strategy, an organisational culture can foster innovation (Hartmann, 2006).

The motivation for this PhD is to challenge the innovation culture of the large project based organisations within the construction industry. These organisations mainly operate in the low-tech part of the industry and are depending on the knowledge and effectiveness of the workforce in the various projects. This raise the question: “how these larger project organisations can be more innovative in a low tech industry often driven by the employees’ knowledge?” Thus one of the main challenges is how to capture the tacit and spoken experience and knowledge of the employees and utilise in the development and innovation work.

The significance in this thesis is that the challenge on the innovative capabilities takes its departure in a methodology that is based on an EDI approach. This approach adapts a systematic involvement of employees in the innovation process centred on idea-generation from employees, and a model that can transform these ideas into new processes or innovative solutions.

1.2. THE CASE ORGANISATION

This research was conducted in collaboration with the Construction Management group at the Department of Mechanical & Manufacturing Engineering at Aalborg University and the governmental client, Danish Defence Estates & Infrastructure Organisation (DDEIO), who was an integrated part of the Danish Defence². DDEIO’s main focus is to develop, operate and deliver the physical conditions that are necessary for the operational forces to succeed, and simultaneously to assist the other authorities within the Danish Defence organisation. The PhD fellow Henrik Sorensen was employed at DDEIO in the R&D department.

DDEIO is managing around 7.000 buildings and structures covering 2.5 million square meters. DDEIO consist of two major divisions; facility management and services in the Danish Defence, and the Building Division (BD) that administrates all buildings and structures, including maintenance, new build and development. This PhD was primarily be rooted in BD employing approximately 180 employees. BD is organised in three departments; the project department that primarily conduct new build, the maintenance department that conduct all maintenance of Defence properties, and the R&D department that conduct all R&D, legal, technical and administration issues. The organisation around BD is still affected by older military traditions, which especially is realised in a bureaucratic and hieratic organisation, in which you should communicate along the chain of command. This also entails a culture, in which many older military officers and civil managers are involved in projects and thus each want their influence forced through. This also results in a

² During the PhD project, DDEIO went through and organisational change process, and no longer a part of the Defence department, but is now directly working under the Defence Ministry. Thus DDEIO is now mainly a civil organisation, instead of a military related organisation.

culture, wherein many officers and managers are involved in projects and thus wants their influence forced through.

Most of the employees in DDEIO are relatively highly educated, and are employed as architects, engineers, Chartered Surveyors, lawyers, controllers, and case workers. DDEIO is organised in a project based organisation, where many of the employees work individually on different projects or with different cases, out of the organisations. Hence, the potential to involve employees in development and innovation tasks is evident in this organisation.

1.3. RESEARCH PROBLEM

Some of the frequent challenges appearing in the construction industry are the fragmented and project based structure, the lowest-cost tender selection, the prescriptive specifications, and adversarial relationships. This often results in projects with cost and time overruns and consequently, to dissatisfied clients. This situation is also considered the main reason of the low level of innovation in the industry (Manley & McFallan, 2006).

Public organisations are continuously stressed with the need for delivering a better service more effectively to its users and costumers. This pressure is emphasised by decreasing funds, higher user-demands, increased media attraction, privatising and so forth. Within governmental construction projects the additional demands are realised, when you weigh them against private projects. In governmental and public projects the framework and conditions are to some extent defined by political decisions that, to some extent, eventually also affect the outcome and services delivered to the citizens. Hence a governmental client has specific obligations to fulfil, as funds provided for the activities are financed by government taxes.

A governmental client organisation that is built on collaboration, knowledge-sharing and exchange of experience, with development and innovation as focal point, is somewhat innovatory. Thus, changing such an organisation to work with an EDI approach in problem-solving and development contains a certain level of novelty. A successful EDI process model is simultaneously considered to have a positive impact on the challenges that a governmental client organisation continuously are faced with, in terms of, cost reductions, more optimised and agile problem-solving process, and in general “to do more with less”. Likewise, development of methodologies to manage creative employees to identify problems or more optimal solutions in the working processes, to generate ideas and transform them into solutions that in the end can be beneficial for the organisation, are, in these settings, also considered to hold at certain level of novelty. Furthermore, it is essential that this development is seen in an interdisciplinary perspective, thus, it can be deeply rooted in all units and at all levels of the organisation.

The overall research problem is centred on the development of an innovation process model to conduct EDI in the perspective of DDEIO's internal and external settings.

1.4. HYPOTHESIS AND RESEARCH QUESTIONS

The main topic of this research was the development of an innovation process model for conducting EDI in large project based organisations within the construction industry. The collection of empirical data and test of methods are centred on the case organisation DDEIO, here it should further be stressed that this research was centred on innovation at an organisational level.

The main objective of this thesis is to enhance the innovation capabilities and the readiness for change in governmental client organisations through an EDI approach.

The thesis takes its starting point in two hypotheses (H):

- H1) Governmental clients are facing considerable efficiency constraints that require that these organisations are agile and dynamic in both service and problem-solving, which is challenging, due to the culture of such public organisations.
- H2) Employee-driven Innovation is a focus area to, on the one hand increase knowledge-sharing, creativity and involvement of employees, and on the other to ensure management systems and abilities to manage creative employees, and further, to generate continuous development and innovation from these creative contributions.

In the research the following research questions (RQ) will be answered:

- RQ1) Which distinctive characteristics of a governmental client organisation should be considered in relation to involving employees in development and innovation processes, and how do they affect the innovation capabilities?
- RQ2) Which areas of the research field of EDI should be integrated into a framework customised to a governmental client organised as a project organisation?
- RQ3) How can strategy, management control system or organisational change be established in order to generate and support an EDI culture within a governmental client organisation?

Further this research also investigates the areas of managing innovative employees, and the decision-making process that ensures that their ideas are utilised in a continual development or as innovative solutions for the benefit of the company as a whole.

1.4.1. DEFINITIONS AND CLARIFICATIONS

This section should clarify some of the key terms that are often used in a more general context, but it is important to understand the perspectives in which they are used in this research.

The term **innovation** is quite ambiguous, hence a clear definition must be applied. This research used the following definition of innovation:

“Innovation is the process of making changes, large and small, radical and incremental, to products, processes, and services that results in the introduction of something new for the organisation that adds value to customers and contribute to the knowledge store of the organisations.” (O’Sullivan & Dooley, 2009, p. 5)

A **governmental client** was in this thesis considered to be a client organisation within the construction industry that is fully financed by public funding, and that is a subject to governmental regulations and legislations. These organisations differ slightly from the traditional public client organisations, especially in relation to the rules, regulations, and legislations.

A **project based organisation** was in this thesis an organisation where the knowledge, capabilities, and resources of the organisation are built up through execution of projects. (Hobday, 2000, pp. 874-875)

Antecedent and **motivational factors** and **sources of motivation** were in this thesis considered somewhat congruent terms.

Another example of ambiguous terms can be seen in the difference between **mechanisms**, **drivers**, and **determinants**, which are all used, more or less, to cover the same phenomenon. Hence a definition of, how they are perceived in this research is seen useful. **Determinants** are in this research considered as more overall enablers or themes of mechanisms for innovation. A **mechanism** is, in this context, considered a means, a tool or a method, thus an actual tangible item (Kesting & Ulhøi, 2010; Tatum, 1986). There are some overlaps in defining drivers and mechanisms, hence a driver could be different types of rewards, whereas the specific mechanisms would be the reward or incentive structure. A **driver** is, in this research, considered to be an underlying cultural element or common belief. It could also be a person, an employee, a product, a process, or a user.

1.5. OUTLINE AND THESIS STRUCTURE

This thesis is based upon a collection of papers, where the central elements of the research are based on the papers that each contributing to the different chapters. The structure of the thesis consists of a cover and two appendices (A and B), where the cover summarises the PhD research in terms of introduction, hypothesises, research questions, research design and the overall conclusions. Appendix A is the collective appendices, directly related to the cover. Appendix B is the full collection of papers³.

The structure of the cover is divided into the following chapters.

CHAPTER 1 – INTRODUCTION

The introduction chapter presents the background and motivation for the PhD, a description of the case organisation, the research background and the research question, and finally some general definitions on important terms used in this research.

CHAPTER 2 – RESEARCH DESIGN

This chapter present the overall research design consideration, the scientific paradigm, and the final research design with a step-by-step description of the PhD research process.

CHAPTER 3 – DEVELOPMENT OF AN EDI PROCESS MODEL

This chapter contain the main research conducted in this PhD. Each section deals with the main themes investigated in this PhD research, and thus elaborates upon the research, presents the findings, and draws some partial conclusion. Furthermore, in this chapter the main contributions are presented. The papers are not presented and elaborated in a separate chapter, but are in the sections of this chapter directly included in terms of introductions, methods, findings and partial conclusions.

CHAPTER 4 – CONCLUSION AND PERSPECTIVES

The conclusion chapter serves to conclude the findings of the conducted research, and draws the overall conclusion of the PhD research process and the partial conclusions presented in the cover. Finally, this chapter gives some overall perspective on the research topic and possible future research.

³ In this thesis papers refers to the publications related to this paper-based thesis, and the notion of articles refers to literature published by other and utilised in this research.

APPENDIX A

This appendix is the collection of the different appendices (A.1-A.5) that directly are related to the chapters and themes elaborated in the thesis. These appendices support the main thesis with the information and elements, which are not essential to get the general understanding of the research presented.

APPENDIX B

In appendix B the full collection of papers, in the format they were submitted for publication, thus, to ensure the original layout of models, figures, tables, schemes, etc., are kept. This, also to ensure that the original papers are presented in the way they were designed, and to give the reader the correct impression of the research and presentation of findings.

CHAPTER 2. RESEARCH DESIGN

In this chapter the overall planning of the research is presented, this include philosophical considerations, methodological choices, empirical data gathering, analysis and writing process. Furthermore, the key concepts of ontology, epistemology, and methodology are clarified in forming a research design with relation to this research.

2.1. SCIENTIFIC PARADIGM

When designing a research design some key philosophical concepts must be applied, these concepts must be combined in a framework or paradigm to ensure credibility and trustworthiness of the research (Guba & Lincoln, 1994). In the following, considerations on some of the key concepts of ontology, epistemology, methodologies in the scientific paradigm is discussed.

In social science and business research the concepts of research paradigms are often considered to be the definition of, which world view or beliefs that guides the research (Guba & Lincoln, 1994). Major paradigms in business research are positivism, postpositivism, critical realism, interpretivism/constructivism and postmodernism (Eriksson & Kovalainen, 2008). Positivism refers to the assumption that knowledge on the world or reality is obtained through applying scientific methods on experiences, and fact that corresponds to a reality that is independent and value-free, and to the priority of observations and measurements (Johnson & Duberley, 2000). Postpositivism is a version of positivism that includes critique of the basic assumptions of positivism, particularly in arguing that knower and the known cannot be separated, and questions the idea of a shared, single reality (Miles & Huberman, 1994). Critical realism could be considered a mixture of the positivist and constructivist thinking, where the assumption is that there is an observable world that is independent of human consciousness, but, at the same time consider knowledge to be socially constructed (Danermark et al., 2002). Interpretivism/-constructivism refers to the assumption that the reality is constructed through social elements as language and shared meanings. This paradigm is occasionally considered as social constructivism, where the interpretive research elements are dominant. The focus being not only upon the contents of the empirical data, but also on how these are produced through individual or group activities, and how individuals understand and perceive the social events and settings, thus, the full complexity of how human sense-making as phenomena emerge. These perspectives allow for many possible interpretations of the same data all potentially that could be meaningful (Alvesson & Willmott, 2003). Postmodernism basically rejects the positivist rational and generalisable research approach, where emphasis is on language and its role and on rejecting common or shared ground for knowing, and

the ‘knower’ as an authority of any knowledge (Johnson & Duberley, 2000). In the following, the philosophical concepts, methodologies and methods that influenced this research is elaborated, with the purpose of providing a better understanding of the research, and add more credibility to the findings.

2.1.1. ONTOLOGY

Ontology focuses on what reality is and what it entails. Ontological assumptions are related to, how the reality is perceived, hence the existence of, and relationships between, the actors and the world in general. In the study of reality, the general ontological continuum is either understood as relativist or realist. Realists refer to an assumption that the social reality exists independently of people, social relations and activities. Relativists, assume that reality is created by the actors and their actions, activities and social relations (Guba & Lincoln, 1994). Thus a in the constructionist view, the reality cannot exist outside individuals, and the reality can only be fully understood by interpreting individuals’ and groups’ actions and activities (Blaikie, 1993)

My overall philosophical position as a researcher is constructivist. I believe in a reality that is dependent and constructed of the actors, their shared meanings and the social activities, that the reality is not value free, that the actors can say, act and mean different things, and that the reality is subjective. Thus, the research paradigm was based upon a constructivist approach, and the ontology is relativist, since the assumption was that the ‘reality’ was constructed by the actors within the case (Guba & Lincoln, 1994).

2.1.2. EPISTEMOLOGY

Epistemology defines the way in which knowledge is framed, how it can be produced, and how it can be argued. There are several epistemological directions, on the one hand there is the positivist direction, in which reality is constituted as general material and observable things, on the other, is the subjectivist direction, where reality is being socially constructed and knowledge is only available through social actors (Eriksson & Kovalainen, 2008). Furthermore, the epistemology is affected by the nature of the relationship between the knower and the reality (Guba & Lincoln, 1994).

This research was based upon the assumption that knowledge could not exist without the individuals and the way they constructed it, thus knowledge was considered subjective. Acknowledging that each individual constructs their own reality in a unique way based on the social relations and activities, the epistemology in this research was subjective. Another reason was that the individuals in this research were not considered to be able to provide a sufficient level of information in terms of their understanding of the research topic. Thus, a positivistic approach

that did not allow for an in-depth analysis of, why the individuals had the meanings they had, or answered the way they did, were not considered a useful epistemological position in this research.

2.1.3. METHODOLOGY

The epistemological direction is closely related to the methodological, but where epistemology is more related to the understanding of, what knowledge is, and how it can be produced and argued for, methodology is merely related to the practical issues on, how a given problem can be studied (Eriksson & Kovalainen, 2008). Methodology can be described broadly, e.g. quantitative or qualitative, or more narrowly e.g. grounded theory or case study (Silverman, 2005). Methodology is thus focussing on the specific ways (methods) that are utilised in research to get a better understanding of reality. Methods can be divided into two; i) methods of data collection, e.g. semi-structured interviews and observations, and ii) methods of data analysis e.g. thematic and narrative analysis. Some methods are more suitable to some methodologies than others, but they are not rigidly bound to each other (Eriksson & Kovalainen, 2008).

Based on the philosophical position, the paradigmatic considerations, and the research questions the methodological approach in this research was a qualitative research approach. This research approach was undertaken as an exploratory case study with a single case and a multiple units, thus an embedded single-case design (Yin, 2009). The case study approach was chosen based on the scope of interest. The case study methodology has its strengths in investigating a contemporary phenomenon in-depth and within its real-life context, and at the same time copes with variables of interest outside the explicit dataset (Yin, 2009). The single case study design was chosen, based upon the acknowledgements that DDEIO as a case represented a unique or an extreme case, within the field of research. This assumption was rooted in the perspectives of the organisational history and settings, the political influences, and the industry. Simultaneously the organisation has several elements in common with the larger project based organisations within the construction industry, thus the case was representative for some typical or common industrial elements. The exploratory approach was chosen based upon the character of the research objectives and the interest in the deeper internal and cultural phenomena of the case (Yin, 2009). In general when conducting qualitative research, it is difficult to ensure real objectivity (Patton, 1990), thus some precautions were undertaken to ensure as little bias as possible. These actions are elaborated in the next section and in the respective chapters, where it was a direct issue. The specific methods used in this case study are presented in the next section, where the research design and processes are elaborated.

2.2. RESEARCH DESIGN

The research in this thesis was conducted in an eight step approach, each having its own scientific contribution, cf. Table 2-1. At each step, methods, output, reasoning level, and the initiatives undertaken to ensure validity and reliability are presented. Furthermore, each step contributes to an increased understanding of the challenges and as guidance to the research throughout the research period.

Table 2-1 The eight steps in which the PhD thesis is conducted.

Description	Method	Output	H/RQ
<p>1 Point of reference</p> <ul style="list-style-type: none"> – In the organisation – In general in the construction industry <p><i>To identify the point of reference for an innovation approach, an analysis of the organisation and general conditions in the industry was conducted.</i></p> <p>Processed in section 3.1</p>	<p><u>Empirical:</u> Interviews</p> <p><u>Analytical:</u> Organisational and content analysis</p>	Paper 1	H1 RQ1
<p>2 Literature review on the EDI research topic</p> <p><i>Review on existing theory and methods within the field of EDI; which areas could be adapted and developed into a framework that will support the conditions surrounding the organisation and culture in DDEIO.</i></p> <p>Processed in section 3.2</p>	<p>Review of existing literature</p> <p><u>Analytical:</u> Content analysis</p>	Paper 2	H2 RQ2
<p>3 Conditions for an EDI approach in the organisation</p> <p><i>Investigation into the challenges and impact areas that need attention, if an EDI approach should be implemented and anchored successfully. Thus, the organisations innovation capabilities and innovation determinants were discovered.</i></p> <p>Processed in section 3.3</p>	<p><u>Empirical:</u> Case study</p> <p><u>Analytical:</u> Content and language analysis</p>	Paper 3 Paper 4	RQ1 RQ2
<p>4 Development and testing of EDI tools and overall framework</p>	<p><u>Empirical:</u> Case study</p>	Paper 4	RQ2

<i>In-depth analysis of data gathered in the case study, with the purpose of designing a framework for conducting EDI.</i>	<u>Analytical:</u> Content and language analysis		
Processed in section 3.3			
5 Setting up the overall theoretical framework	Synthesis	Paper 5	RQ3
<i>Selection and clarification of determinants and methods from the EDI methodology to be the focal point in an EDI framework.</i>			
Processed in section 3.4			
6 Reviewing the applicability	<u>Empirical:</u> Expert interviews	Paper 5	RQ3
<i>Selection and adjustment of the most important mechanisms and drivers identified and developed in 3rd and 5th step based on expert interviews.</i>	<u>Analytical:</u> Content analysis		
Processed in section 3.5			
7 Development of an EDI process model	<u>Empirical:</u> Case study	Paper 6	H2 RQ3
<i>Identification of the specific mechanisms to conduct EDI. Development of an EDI process model with, and respect to, the existent environment and settings in BD.</i>	Synthesis		
Processed in section 3.6 and section 3.7	<u>Analytical:</u> Content and language analysis		

Table 2-1 summarises the framework of the research conducted, and provides an overview of, how each step in this research is presented in the following chapter, 3, and how the research and research questions are related to the steps in the framework and the sections of the chapter.

Before presenting the research design a short clarification of the reasoning in this research should be provided. The two basic methods of reasoning, induction and deduction, have a very different perspective when conducting research. Inductive reasoning is more open-ended and exploratory, especially at the beginning. Deductive reasoning is narrower and is concerned with testing or confirming hypotheses. This research involved both inductive and deductive reasoning methods at one or another point during the research process, but the general reasoning level for understanding and interpreting the data was inductive in terms of generating and inductively developing patterns of meanings and new insights on theory.

In general in qualitative research intrusion of the researchers' bias is inevitable, and since some of the members of the research group had relation to the case organisation, some precautions had to be applied. To ensure the quality and validity, the research group put a lot of emphasis in addressing Guba (1981)'s criteria for trustworthiness of qualitative research; credibility, transferability, dependability, and confirmability. These criteria are evaluated for each step, cf. Appendix A.1.

STEP 1

This step was a preliminary study where the hypotheses were proposed and the first hypothesis was tested within the case organisation. The outset was previously obtained knowledge and theory on the field of innovation and the general settings of the construction industry. These elements formed the base of knowledge to propose two hypotheses, cf. section 1.4. The first hypothesis was tested through semi-structured interviews within the case organisation, and the empirical data was analysed through a content analysis with the purpose of exploiting reoccurring themes and tendencies in the dataset. The reasoning was deductive since the primary objective was to test the hypothesis, and to prove that this research had some substantial objectives to investigate. The output of this step is summarised in paper 1, cf. Appendix B.

STEP 2

The second step of the research process was to construct a theoretical landscape, the method utilised was an extensive and systematic literature study, for a full description see Appendix B – paper 2. The input to the literature study was keywords and themes, based upon both prior experience and the data from step 1. The articles were reviewed and exposed to a content analysis with the purpose of identifying the overall themes, methods, and tools within the EDI field of research. The main output was identification of the most applicable theoretical elements that should be integrated into a framework of EDI that support the cultural settings within the case organisations. The reasoning level of this step could be considered partly inductive and partly deductive, inductive in the sense that some of the input to the literature study was induced from the semi-structured interviews in step 1, and deductive since the general theories on EDI were deduced from a more specific theoretical landscape based on the case and industrial settings.

STEP 3

This step was undertaken as an exploratory case study with a single case and a multiple units approach. The single case was the case organisation DDEIO and the multiple units were different groups of employees and managers. The method used was a gaming approach to stimulate the participants to engage actively in the case study, for a full overview of the case study research in step 3 see Appendix B – paper 3. This step was mainly concerned with designing the gaming approach, conducting the case study activities, a light thematic analysis of the content, and

finalising a thorough description of the process, these elements implying that the reasoning level was inductive. The output, cf. paper 3, was presented at a conference to receive some feed-back and comments on the gaming approach, and to present the initial findings, before conducting the in-depth content analysis and setting up the overall EDI framework.

STEP 4

Step 4 was an in-depth content analysis of the data gathered in the case study in step 3. The data was coded in overall themes and the most substantial determinants, mechanisms and drivers in relation to constructing an EDI framework for the case organisation were identified. The full description of this part of the research can be seen in Appendix B – paper 4. The in-depth thematic analysis of the content and thorough discussion on the findings implied that the method of reasoning was inductive, as in step 4.

STEP 5

This step could be considered a synthesis, where the data and findings from step 1 and 4 were constructed into a framework of determinants, mechanisms, methods and tools for conducting EDI in the settings of the case organisation. Thus framework was both based on the both theoretical and empirical data collected through the research conducted in step 1 to 4, and can be seen in Appendix B – paper 5.

STEP 6

Step 6 was centred on an expert review of the applicability of the EDI framework developed in step 5. The eight experts participating in this research were a mixture of academics and practitioners in and around the field of EDI. The experts were interviewed individually in an expert and quasi-expert conversation approach on different themes of the EDI framework, partly covering one-another, and where the research/interviewer was considered a quasi-expert of the research topic. The interviews were digitally recorded and exposed to a content analysis. A full description of the research and overview of the findings can be found in Appendix B – paper 5. In this step the reasoning is deductive, going from the EDI framework to the expert review input assessing the applicability of the framework and suggesting areas of improvement.

STEP 7

In this step the data from the case study in step 3 were re-coded, based on the findings in step 6 to identify some specific mechanisms and drivers unique to the case organisation. These elements should serve as an input to transform the framework into a more applicability EDI process model. The reasoning level in this step is, contrary to step 6, inductive, when inducing the input from the expert interviews to construct a more general and applicable EDI process model. The research as a whole can be seen in Appendix B – paper 6.

CHAPTER 3. DEVELOPMENT OF AN EDI PROCESS MODEL

In this chapter all of the research carried out, to gain insights to develop an innovation process model for conducting EDI, is presented. The methodological approaches and findings presented in this chapter, is based on the research framework presented in Table 2-1. During the chapter, the different research activities are regularly linked to the published papers in Appendix B, where the full scope of the different research activities is presented in its published form.

3.1. INNOVATION CAPABILITIES

To get a better understanding of the innovation capabilities of the case organisation, a pre-study was conducted. Its main interest was to identify some of the overall perspectives on the employees' mindset towards innovation and how they perceived innovation in relation to their work environment. For the full work on this research see paper 1 in appendix B.

This part of the research was related to approach RQ1)

Which distinctive characteristics of a governmental client organisation should be considered in relation to involving employees in development and innovation processes, and how do they affect the innovation capabilities?

3.1.1. INTRODUCTION

The research topic for this thesis is the EDI approach, and in this relation how the innovative employees should be managed. Thus, to explore the innovative capabilities of the organisation, the employees were an important source of data.

Based on the research design and the research paradigm, the employees were approached through semi-structured interviews to ensure an open and focused two-way communication with the employee. The full interview guide can be seen in Appendix A.2. Utilising this method to explore the employees' perceptions, meanings and experience should ensure a confirmation of what is already known, and the possibility to investigate new points of views and interesting topics

emerging throughout the interviews. The selection of the respondents to this pre-study was based on the following criteria:

1. They should be affiliated with a geographically spread office location.
2. They should occupy different job-functions.
3. They should have various experience and length of employment.
4. They should be of various ages.

The criteria of the selected respondents are shown in Table 3-1.

Table 3-1 Employees for semi-structured interview: PM = Project Manager, CM = Construction Manager, CMM = Construction Maintenance Manager

Respondent	Job function	Experience	Location	Age (app.)
1	Architect - PM	8 years	East office 1	50 years
2	Engineer - CM	3 years	West office	38 years
3	Chartered Surveyor - CMM	2 years	North office	30 years
4	Engineer - CMM	4 years	South office	32 years
5	Engineer - CM	25 years	East office 2	60 years

To ensure that the interviewees were open-minded and spoke without stinting, they all figure anonymously in the documentation. All questions were formulated as openly and objectively as possible, to both ensure that the interviewee did not sense any bias from the researcher or the questions, and to compel them to reflect why they answered in the given way. All interviews were audio recorded to enhance documentation and support the following analysis.

The collected qualitative data was analysed in two steps. First, some of the answers were, as far as possible, quantified to see how many of the interviewees answered in the same way, or at least in the same direction. Secondly, the semi-structured interviews were transcribed in full length and the answers were analysed for recurrences, keywords or statements that could indicate an attitude or feeling to a specific subject that are not clearly spoken in the answer.

3.1.2. PERSPECTIVES ON INNOVATION CAPABILITIES

The most relevant questions from the semi-structured interviews and their respective answers for mapping the boundary conditions for EDI are shown in Appendix B – Paper 1, where they are named Q1 to Q4. Here follows a discussion and summary of the answers.

Q1: 3/5 of the respondents' answers indicated that in general the employees are not motivated for involvement in the development processes. 40% indicated that there could be some motivation in participating in development. 60% also indicated that the motivation to engage in development is mainly visible amongst the younger employees, and that the development merely is based on informal knowledge-sharing between employees.

Q2: 5/5 of the respondents answered that their department had neither activities that gathered experience and ideas or utilised them systematically in the development of the organisational processes. According to a keyword analysis, the knowledge-sharing and idea generation were based on individual employees and the process was informally and irregularly driven. Any innovative effort was mostly seen from employees with less experience, since they were more open-minded and had less faith in the bureaucratically paradigms defining the problem-solving processes. Whereas the more experienced employees had been in the system for a longer period and had adjusted to the organisational culture and processes, thus they did not have the same wish for change.

Q3: 5/5 of the respondents answered that there was no broad and systematic involvement of employees. The keywords related to the answers suggested that the process was random and based on the same individuals, who were passionate in seeing new solutions and innovative approaches to the problem-solving processes. Hence, the innovation potential was related to a more systematic approach in involving the employees.

Q4: Two of the most significant obstacles for the development to be driven by the employees were the time and resource issue, and the management support in prioritising the development approach in daily working processes.

3.1.3. PARTIAL CONCLUSION

The RQ was answered by exploiting some perspectives on potential drivers and obstacles for conducting EDI in a government client organisation. These were discovered as:

DRIVERS: The curiosity should especially emanate from the new employees. Motivation should emerge from management support in prioritising time to development and idea generation.

OBSTACLES: There were no incentives or motivation to engage in developmental and innovative activities. The general management focus was on production tasks, hence no management support. Not a systematic approach to facilitate idea generation or knowledge-sharing. Organisational culture, development and innovation were based on the individuals own beliefs.

Some of the obstacles discovered through the interviews were convergent with those emphasised by (Kesting and Ulhøi 2010), indicating that they were of a more general character and could be point of departure for a broader framework for conduction EDI.

To advance this preliminary study, a body of knowledge and a screening of the theoretical landscape of EDI should be conducted. Furthermore, this will form the base for developing a framework of tools and methods for engaging in EDI in a governmental client organisation.

3.2. THEORETICAL LANDSCAPE OF EMPLOYEE-DRIVEN INNOVATION

The theoretical landscape was constructed through an extensive literature study. The overall themes of interest were the perspectives related to conducting EDI in a governmental client organisation, with a project based organisation, and within the construction industry. For a full description of the literature study process and findings see Appendix B - paper 2.

3.2.1. INTRODUCTION

In project based organisations within the construction industry⁴ the product and process knowledge are closely related to individual employees. This knowledge is often very difficult to identify, hence difficult to collect, share and utilise across the organisation. To succeed, a systematic framework or methodology such as EDI, which features tools for managing structure, culture and methods in project organisations, would be beneficial.

The main objective of this research was formulated in RQ2:

Which areas of the research field of EDI should be integrated into a framework customised to a governmental client organised as a project organisation?

⁴ Due to research traditions in the conference proceedings, the paper related to this chapter defines the construction industry as the “build environment”, but in this thesis the term construction industry is used.

3.2.2. THE PROCESS OF THE LITERATURE STUDY

The literature study was structured in three phases: The first phase involving identification of the most significant keywords related to conducting EDI was identified. The keywords were selected based on prior experience obtained through research within the fields of construction management and innovation, and through discussions with research colleagues. The keywords identified were; employee, innovation, management, construction management, project organisation, management control systems.

The second phase was approached systematically to identify and form a base of knowledge. This phase was guided by the steps followed in Pittaway et al. (2004) and Levy and Ellis (2006). Through a citation database review, the following citation databases were chosen; *Web of Science*, *Business Source Premier*, *JSTOR* and *ABI ProQuest*. Search strings formed by combinations of keywords were applied to the citation databases, which resulted in a list of 300 peer-reviewed articles. These articles were categorised according to their relevance in an A, B, and C list:

- The A-list represents articles of high relevance and the full articles are included in the review and analysed (109 articles)
- The B-list represents articles of some relevance, but with more doubtful empirical data. (82 articles)
- The C-list represents articles with little relevance or articles that have a more conceptual approach or background of the topic. (109 articles)

The final selection of the A-list articles was conducted based on the following quality criteria; *theories robustness/state-of-the-art*, *the use of data*, *implementation potential*, and *potential transferability/ generalibility*. This approach resulted in that the A-list had to be subdivided in to an A+ and an A list, the main reason being the large number, but also the process of ranking the articles gave this natural selection on the A list articles. The A+ list contained 46 articles and the A list, 63.

The third phase was coding the themes in the A+ list articles using the analytical program NVivo. NVivo was utilised to generate a general impression of the themes that arose from the articles in the A+ list. The themes that emanated from the coding are illustrated in Appendix B – paper 2.

3.2.3. THE THEORETICAL LANDSCAPE OF EDI

The articles were reviewed according to themes (cf. table in Appendix B – paper 2) occurring from the NVivo analysis focusing on identifying methodologies to form a framework for conducting EDI in relation to the RQ.

Through the systematic review of EDI, a theoretical landscape was identified to give an overview of the research topic. Through the themes identified, the objective was to form a base of evidence for developing an overall theoretical framework, with each theme holding a number of tools and methods to conduct, and implement, in an EDI process.

The most important theories found in the literature study that should be adapted in a framework or innovation process model were:

- Innovation management
- Knowledge management
- Human resource management

Managing the innovation requires focus on motivation, communication, commitment, recognition and participation. Innovation management also concerns ensuring, through rewards and recognitions to the owner of the idea, that the involved employees contribute and do not keep the ideas to themselves. Ideation from the employees should be followed by an evaluation and selection of ideas, where the most suggested tool was voting schemes. It is important for managers to reflect on the possibility that various types of innovative behaviour can be integrated in several stages of an innovation process. One of the most important skills of managing innovative group dynamics is to know when to leave organisation hierarchy out of the process, and when to bring it back again (Leavy, 2005). The leading challenge for innovative organisation is maintaining the balance between innovation and efficiency, as they grow and develop.

Ideation is based on the knowledge of the employees, where the most essential type of knowledge is the intellectual capital that broadly consists of human capital, structural capital and social capital. Managing this knowledge is centred on coding the implicit and tacit knowledge amongst the employees, and facilitation of the processes that allow this knowledge to transform into ideas. Hence, Knowledge Management is dependent on the manager's ability to create explicit knowledge from the employees' tacit knowledge.

3.2.4. PARTIAL CONCLUSION

When organisations begin implementing innovative processes it is important to initiate the following activities:

- Definition of an innovation strategy and the innovative behaviour that places people and ideas at the heart of the management philosophy, giving people room to grow to try things, learn from their mistakes and building openness and trust across the organisation.
- Finding antecedents to commit and motivate employees
- Defining the balance between the pairs, play and discipline and creativity and efficiency.
- Customisation and implementation of a system or structure to process ideas to innovative and sustainable solutions, and profit.
- Implementation of commitment-oriented HRM to create more ownership for work issues amongst the employees

The next step of this research was to exploit the case organisations attitude towards the theoretical landscape. The purpose was twofold, on the one hand, the purpose was to identify the gaps in the literature on innovation, to identify why innovation still isn't more integrated in the construction industry, and on the other, the purpose was to gain some insights in order to develop a specific framework of tools and methods that could be customised into an innovation process model for the project based organisations in the construction industry.

3.3. DETERMINANTS FOR SUPPORTING EMPLOYEE-DRIVEN INNOVATION

In the quest of challenging the innovation capabilities of the construction industry, and seeking to understand why innovation is not more broadly accepted in the industry, i) the gaps in literature, ii) the insights and input to develop an innovation framework were considered as two options to explore. Identifying the determinants for innovation in a governmental client organisation was considered a suitable approach to get an understanding of both the practical and the theoretical perspectives of EDI and to gain insights to develop an EDI framework.

3.3.1. INTRODUCTION

Through a larger case study involving employees and managers within the case organisation, determinants in terms of mechanisms, drivers, and obstacles for conducting EDI were identified. The full research approach can be seen in Appendix B – paper 3 and 4.

The findings of this research should likewise provide insights to the objectives highlighted in RQ3.

How can strategy, management control system or organisational change be established in order to generate and support an EDI culture within a governmental client organisation?

The method utilised in this case study was a gaming approach. The main purpose of this particular approach was to present some of the most essential theoretical EDI themes and challenges discovered in the literature study to a representative sample of the employees and managers in the organisation. The data was exposed to a content analysis to identify overall determinants and mechanisms for conducting EDI in the case organisational settings and discussed in relation to the theoretical perspectives from the literature study.

3.3.2. THE GAMING APPROACH

In the following the game set-up is presented. The game was designed to facilitate group discussions based on the basic requirements to an innovation process model (Buijs, 2003; Koen et al., 2001; Kolb, 1976; Roozenburg & Eekels, 1995) The basic requirements for conducting innovation that were interesting to investigate in the case organisation were: i) the capabilities to conduct ideation, ii) selection and evaluation of ideas, iii) further development of ideas, and iv) implementation of ideas and new concepts.

The procedure of the gaming approach was that each play consisted of two rounds, in each round three themes-strings were discussed, see Figure 3-1. Each theme began by predefined obstacles formed by the research group, the obstacles were defined based upon the theoretical studies on EDI and transformed into everyday scenarios with outset in the organisational practices.

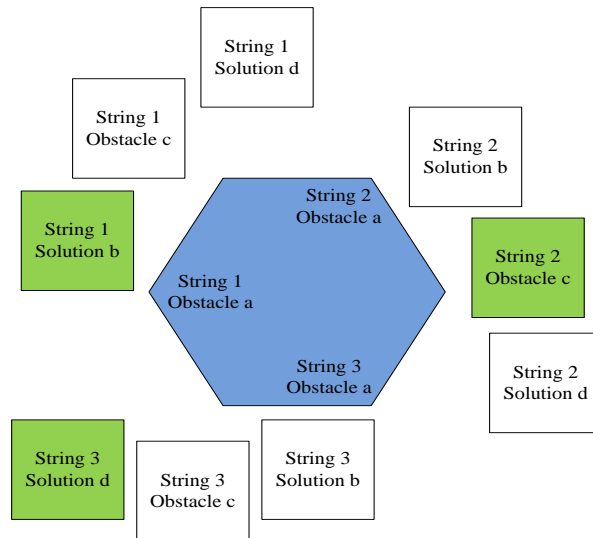


Figure 3-1 Graphical presentation of the game board and process.

Firstly the participants were randomly selected and divided into three groups. After an introduction by the game master, the game passed through the following steps:

1. Each group discussed the predefined obstacles (a), during the discussion each group should agree on one common solution (b) to how the obstacle could be handled.
2. The groups shortly presented their results in plenum, and the other groups could ask clarifying questions to ensure that the solutions were interpreted correctly.
3. The groups rotated to the next string, according to the green coloured quadrants in Figure 3-1.
4. Each group now discussed the previous group's solution (b) and should agree on one primary obstacle (c), as to why the solution (b) would not work in practice.
5. Again the groups presented in plenum, and rotated to the next string.
6. The groups now discussed the obstacles (c) from the previous groups, and should agree on a final solution (d).
7. Finally, the participants gathered round the game board and briefly discussed the obstacles, solutions and the overall gaming process.
8. Round two was identical to the first, but with a new set of predefined obstacles and participants were divided into new groups to ensure dynamic discussions. The timeframe for each round of play was 45 minutes.

This process allowed all three groups to contribute in each of the three theme-strings. All obstacles and solutions were written down on game cards by the groups. If a group had more than one solution or obstacle, they could write the secondary ones on a note scheme. During all the games played, members of the research group made observations on the discussions and the plenum presentations to see, how and if the acting, talking, behaviour, etc. of the participants would provide some secondary input, or add some information to the phenomena studied. Further, the game master or facilitator had an important role, namely to ensure that all game cards or drivers and obstacles suggested, were discussed and elaborated as much as possible.

During the analysis the data was divided into primary and secondary data. The primary data was the game cards that the participants agreed on during the group discussions, and the secondary data was the data written on the note schemes, supported by the observations made by the researchers. The total amount of data entries was 231, combined of 72 primary data and 159 secondary data. The data was exposed to a content analysis focussing on identifying and coding themes, and mapping the landscape of conducting EDI in the case organisation, which further allows discussions on the area of tension between the practical readiness and the theoretical approach to EDI (Miles & Huberman, 1994). An example on the content analysis and the thematic coding can be seen in Appendix A.3.

3.3.3. THEMES AND DETERMINANTS FOR CONDUCTING EDI

The overall themes of determinants identified in the content analysis can be seen in Appendix B – paper 3. In this section the key determinants to incorporate in a framework for conducting EDI in the case organisational settings are presented.

In addition to the content analysis, the organisations innovation capabilities were assessed according to Essmann and du Preez (2009)'s innovative maturity level framework, with the purpose of identifying the enablers moving the organisation forward to the next level. This assessment was not directly from the primary and secondary data, but merely based on the overall sum of empirical data from the case study. The organisations innovative maturity level alone is 1, p. 403 in (Essmann & du Preez, 2009), but assessed in the three-dimensional framework, the organisations overall rating is 1.6, see Appendix B – paper 3. This indicates that there were some of the innovation capabilities already present in the organisation, such as formal and informal knowledge-sharing, internal and external network and collaboration, developing and acquiring competencies and technology.

The main themes and related key determinants identified, cf. Appendix B – paper 4, were:

Knowledge Management

The findings from the case study indicated that the organisation should have some attention drawn towards the importance of knowledge-sharing. In both primary and secondary data the knowledge-sharing theme was ranked with the fourth highest tendency. The underlying data entries are centred on formal and informal knowledge-sharing, knowledge-sharing groups, meetings, and workshops, these activities can stimulate such as more tacit knowledge is spoken and shared in and across the organisation, where as the management has a better chance of capturing and utilising this knowledge. The dilemma in knowledge management is in the approach; thus to what degree should it be driven and supported by management practices, by technology, or by organisational practices such as formal and informal meetings (Bonnie & Monica, 2007). This issue should be resolved with outset in the employees' preferences, and as close to well-known procedures as is possible. If this is completed it would enhance the possibilities that the employees will be motivated to participate in these activities, and simultaneously trust the process.

Employee motivation

To keep the employees motivated, they need the right motivational factors in terms of job character, rewards, culture, and involvement in decision-making (Amar, 2004) (Adams et al., 2006; de Sousa et al., 2012). The findings indicated employee empowerment, education and professionalising of employees, that employees in general should be more involved in decision-making, and have more personal benefits. Another issue to enhance employee motivation was recognition and trust from management, and financial related incentives. From this it could be concluded that motivation of employees must be addressed in at least three perspectives, education and professionalising, trust and empowerment, and salary or financial related motivational factors. The main challenge in designing an incentive structure is to identify which motivational factors or incentives that apply to all level of employees within the organisation.

Innovation management

The findings from this case study highlighted the managerial aspects of innovation management such as: focus and support, communication of strategy, possibilities and priorities, and at the same time the innovation management should promote ideas and remove the obstacles. The identified pitfalls related to innovation management were the focus on avoiding resistance against change, and lacking resources, especially resistance against change is often considered an obstacle associated with novelty, innovation, and changes, since these can interfere with the existing organisation and the 'safe' area that has been known to the employees for several years. The innovation management should motivate these employees, and promote and lead the changes, which includes managing the paradox or tension between the creative employees and their expectations to rapid decisions and resolution of innovative issues.

Innovative organisations

From theory it was found that becoming an innovative organisation is a comprehensive process of change, the aspect embraces various cultural and structural aspects. Some of the most important identified were the four factors, i) people and ideas should be placed central in the organisation, ii) people should be giving room to grow and try ideas, and learn from their mistakes, iii) a culture of openness and trust should be build across the organisation, and iv) the internal mobility of talents should be facilitated and stimulated. The findings emphasised some important determinants as: organisational culture, development of process descriptions and paradigms, seminars and workshops in both ideation and evaluation of innovative ideas, professional process facilitator, decision-making committees of both employees and managers, and support teams and reference groups. One pitfall for innovative organisations is, if the support structure causes too many setbacks the motivation from the employees would diminish over time. Another challenge in implementing EDI in general is the need for empowerment of employees and the acceptance of employee autonomy (Mansfeld et al., 2010). In relation to the case organisation this is considered an important challenge, since the organisational characteristics are a tradition bound and bureaucratic, where several problem-solving processes, and activities, are well defined and structured in paradigms. The organisational settings and the required changes need to be well thought and absorbed before the innovation process can be successfully implemented. Another aspect that should be considered is that too much creativity and autonomy can damage the performance of the primary production activities.

Human Resource Management

The findings also highlight this theme as an important issue in terms of employing committed employees and use their commitment as leading the changes as fireballs, and a professional process facilitator. The aspects of recruiting higher skilled employees and implementation of a sufficient Human Resource Management (HRM) strategy related to the innovation strategy are often underestimated. The potential of having passionate employees with proper skills, and with the potential of becoming culture bearer, is a key asset in utilising HRM to support the innovative capabilities.

3.3.4. PARTIAL CONCLUSION

The findings and discussions emphasised the following overall determinants to approach the research question:

STRATEGIC related was the communication of the innovation strategy, the overall priorities and definitions defined in an innovation process description, and in paradigms for the innovative activities.

MANAGEMENT CONTROL SYSTEMS related was managerial focus on project and process management skills; recognition and trust, motivation and support, and encouragement of employees to question existing working routines, especially from the upper management.

ORGANISATIONAL CHANGES related was sharing common values and ensuring common cultural attributes to support innovation across the organisation, priority of knowledge-sharing, employee empowerment, education and professionalising of employees, and employment of passionate employees with relevant skills to become fireballs and culture bearers.

The next step in this research was to develop and construct an innovation framework to fit the case organisation with outset in the determinants discovered through this case study research.

3.4. DEVELOPMENT OF INNOVATION FRAMEWORK

Based on the findings from the case study research, the theoretical perspectives from literature study, and the initial pre-study on the case organisation's innovative capabilities, a framework of tools and methods for EDI was developed.

3.4.1. INTRODUCTION

Having identified and elaborated some of the important determinants and overall mechanisms for innovation with outset in the case study findings, the literature study and the pre-study, another interesting aspect is the discussion on designing an innovation model or process. As industries and organisations matures, the innovative focus tend to move from product to process, and from radical to incremental innovations (Abernathy & Utterback, 1978; Tidd, 2001), established firms even tend to be blind to disruptive innovation, which are more likely to be exploit by new entrants (C. M. Christensen, 1997). This research emphasised that an innovation process should be capable of handling both incremental and radical innovation, with in the different types of innovative approaches; process, product, technology, and employee driven. This perspective is shared by (Rowley et al., 2011), where radical and incremental innovation are considered innovation attributes of any type of innovation, rather a type of innovation per se. Recently (Williams, 2011) concluded that the stage-gate or phase-gate, as they also denote it, is not suitable for managing all innovation related processes, it's more or less only suitable for new product development. The weakness of the stage-gate model is lacking focus on 'front end' activities, lacking possibilities of overlapping and iteration between stages, and inability to manage multiple efforts within the same pipeline.

The combination of the elements in this framework should give the first insights to approach RQ3:

How can strategy, management control system or organisational change be established in order to generate and support an EDI culture within a governmental client organisation?

The full discussion on this topic can be seen in Appendix 2 - Paper 4.

3.4.2. FRAMEWORK FOR EMPLOYEE-DRIVEN INNOVATION

In general the considerations on this framework were based on a systematic approach to innovation and innovation management, where the range of activities that are needed to turn ideas into profit and added value, should be structured in a holistic framework or model, and an evaluation of innovation management should improve performance, inspired from (Adams et al., 2006; Tidd & Bessant, 2009).

The innovation framework was designed based on innovation at an organisational level, not project level, of a governmental client organisation within the construction industry. The main purpose of the framework, cf. Figure 3-2, was to develop a framework, supporting a process driven by placing the employees' knowledge and wish to improve and develop the organisation in the heart of the innovation strategy. This overall purpose was based on the acknowledgement that the employees are closest to the problem-solving, the customers, and the market. Hence, the employees can be considered the first interface between the organisation and the surroundings, and could hereof be considered one of the most potential sources of innovation.

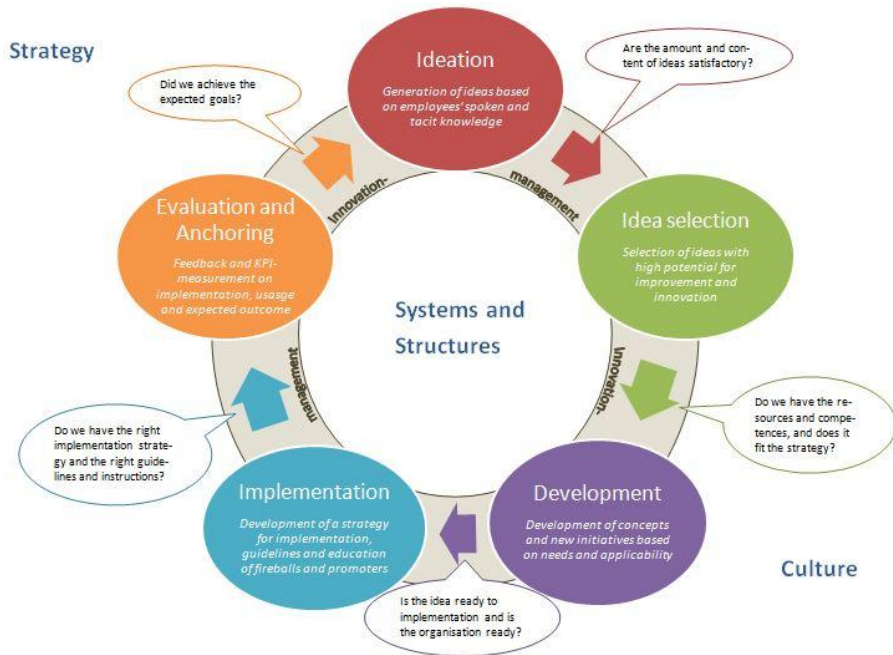


Figure 3-2 Innovation framework for conducting EDI.

The key aspect of this framework was the focus upon involving the employees in the early stages of the innovation process, thus the knowledge, experience and creativity that the employees achieve through their daily problem-solving on projects out of the organisation, should be transformed into innovative contributions to develop the organisation internally. Further this approach should empower the employees to take responsibility, motivate them to challenge the working routines and think “out-of-the-box”, and giving them decision-making competences particular in relation to the innovation process.

The framework is based on 5 sub-processes that are the central steps in transforming and realising the employees’ ideas and knowledge to added value and innovation. Each element in the framework is described in Appendix A.4, where focus areas, input and output, tools and methods, and central roles of each sub-process are described. In short the framework can start in each of the 5 sub-processes, but often it would have an outset in ideas or suggestions generated in the *Ideation* process. When ideas the amount of ideas or input to innovation either in general or in a framed context, the ideas with the highest potential are selected in *Idea selection*. When resources are prioritised and a project is formed, the ideas enter the *Development*. Based on the background for the idea and the issues it potentially could resolve, a conceptual model is developed and tested. When the idea is conceptualised and ready for implementation, the idea or concept enters

Implementation. Based on the implementation strategy and the process of pre-testing mock-ups, etc., the innovation concept reaches *Evaluation and anchoring*, where the potential is evaluated and the final assessment of, if the concept turned into an innovation. The 5 sub-processes are each followed by a decision or evaluation phase that should decide if the process has reached a satisfactory level according to the preconditions to proceed to the next phase in the process. To ensure that the innovation process including the 5 sub-processes and the 5 evaluation phases are continuously running, a central element is the innovation management that follows the process from start to end. Surrounding the framework there are supporting and defining elements, such as the innovation strategy framing the process, the systems and structures supporting the process, and the organisational culture that support the innovative behaviour and mindset, and motivate the employees to get involved in innovation process. Each step is fully described in Appendix A.3.

3.4.3. PARTIAL CONCLUSION

The development of the framework provided an understanding of the different elements to be included in an innovation framework, and how they should be structured and combined in the perspective of some of the more generic innovation process model aspects. Each sub-process was defined, and the related methods, tools, roles, and input and output were specified. The development of the framework further added to a more practical understanding of the strategic perspectives, and the determinants and mechanisms necessary to develop the framework into a more applicable innovation process model. At the same time the development of the framework emphasised the fact that some elements of the framework needed to be elaborated more, in terms of enhancing the applicability and strengthen of the process perspectives.

3.5. EXPERT REVIEWS OF THE EDI FRAMEWORK

With the ambition of transforming the framework into a more applicable innovation process model, and in the acknowledgement that the framework had some strengths and weaknesses, the framework was exposed to an expert panel review. The following section is based upon paper 5 in Appendix B.

3.5.1. INTRODUCTION

The expert panel was designed based on a wish to combine theoretical and academic profiles with specialist and experienced profiles in the different areas of EDI, and in and around the different themes in the developed framework. Eight

experts were invited to participate in the expert panel. The approach was a mixed methods approach based on an expert panel as a focus group combined with individual semi-structured interviews (Creswell & Clark, 2007; Muskat et al., 2012). This approach was chosen for two main reasons, firstly, it was basically impossible to assemble all experts at the same time in a focus group or a panel debate, secondly, the main interest was in coding the different answers and perspectives, and not in generating a debate or discussion amongst the experts. An expert was in this sense someone, who had technical, process oriented, and interpretive knowledge referring to their specific professional sphere of activity (Flick, 2009). Thus, expert knowledge did not only consist of systematised and reflexively accessible specialist knowledge, but it had the character of practical knowledge in the overall themes within the framework.

Eight experts were interviewed using a semi-structured interview guide, cf. Appendix B – paper 5, the interviews, which typically lasted for 45 minutes, were recorded but without a subsequent transcription. The approach of an expert interview is a speciality within the semi-structured interview as the experts are determined deliberately. The experts were either academic domain experts or industrial practitioners, with a proven track record for successful innovation. The aim of the expert interview was to conduct a quasi-normal conversation between the expert and the interviewer. An expert interview is characterised by the form being a discussion on an equal footing between the expert and the interviewer (researcher), hence the interviewer must be a quasi-expert (Bogner et al., 2009). The experts had the questions sent to them on beforehand and therefore had the possibility to prepare for the interview. The expert interview guide can be seen in appendix B – paper 5. The findings in this research contributed to approach RQ3:

How can strategy, management control system or organisational change be established in order to generate and support an EDI culture within a governmental client organisation?

3.5.2. FINDINGS

The main objective of this research was, through a series of expert interviews, to gain insights in, and perspectives on, a framework for conducting EDI in a large governmental client organisation with a project based organisational architecture. These perspectives should form a base of knowledge to transform the framework into a more applicable innovation process model.

The analytical framework for analysing the findings was based on a language and content analysis, focussing on coding and identifying themes, patterns, and tendencies, and furthermore to investigate convergent and divergent answers, both between the experts, and likewise in relation to the developed innovation framework for conducting EDI cf. Figure 3-2. The analytical framework utilised in the coding were inspired by the literature study and case study research, cf. section 3.2 and 3.3. An overview of the answers from the expert interviews can be seen in Appendix B – paper 5. The experts were interviewed individually, but with a starting point in the same open-ended questions, and the naturally the same framework, hence, the prerequisites were identical for each expert.

From the theoretical perspective the main discussion was on the process model design, and in the field of tension between the stage-gate approach and the more complex, iterative, and chaotic approach. Based on a theoretical screening and on the expert interviews, it became apparent that it is more important to develop an innovation process, which the organisation is comfortable with, and that is scalable in terms of minor incremental or major radical innovations, than different models for different purposes. Neither the process nor the roles should be approached differently; it is the activities and the people that fill the roles that should be modified according to the type of innovation and/or scale of process that is required, in order to turn the idea into a successful innovation. Likewise, when designing an innovation process model, radical or incrementally oriented, it is important to pay attention to the cultural settings, and to differentiate when there is a need for innovation leadership, versus when there is a need for innovation management. Darsø (2012) suggests that the creativity of innovation could take place in a parallel organisation, outside the basic organisation. The early creative phase of an innovation process is considered a preproject, and later when it comes to implementation and anchoring of the innovation, it is considered a more traditional project and is moved into the basic organisation. This research emphasised that leadership was related merely to the initial creative preproject phases, and that management was more related to the more formalised project phase processed and anchored in the basic organisation.

3.5.3. PARTIAL CONCLUSION

When an organisation takes an approach towards innovation, it is very important to put emphasis on the integration of; cultural aspects, the HRM perspective, innovation mechanisms, and the framing of the innovation process. Furthermore, changing the organisational practices in the perspective of sharing and capturing knowledge, and that support from the management should provide security concerning the employees' main tasks, when they engage themselves in innovation projects. In the acknowledgement of the fact that working with innovation is a comprehensive and experience demanding process, a suitable starting point is to obtain some experience with innovation by taking outset in the picking of the 'low

hanging fruits', and by approaching innovation through problem-solving, defined and framed by the management. In addition, design and planning of the innovation activities in shorter and more focused activities with clear targets, could have a positive effect on the employees' motivation in terms of more transparency and more manageable resources.

Some of the experts emphasised that the lower-level management has a huge impact on the early phases of an innovation process, due to their decision-making competence on, wheatear employees' ideas should be priorities contrary to organizational or production targets. If the organisation has not got innovation targets included in their performance measurements, then the motivation and incentives for the lower-level management, which often are managers who have ambitions on rising within the organisation, to allow for resource spending on innovation could be very low. Eventually this managerial level then could turn out to be one of the larger obstacles in conduction innovation, if the overall strategy and the organisational goal is not communicated to, and followed by, all levels of both management and employees within the organisation.

A subject for further research was to identify and elaborate the specific mechanisms that motivate employees to participate in innovation activities that are conducted in unstable surroundings, and where the employees have to leaving their daily assignments, and stable work environment. The unstable surroundings, in this case, are the influence by the political system, the bureaucratic and project based organisation, and the more tradition bound construction industry.

3.6. MECHANISAMS FOR EMPLOYEE-DRIVEN INNOVATION

Based upon the expert interviews, the case study findings were re-coded with the purpose of identifying and elaborating more on specific mechanisms for motivating employees, in the case organisational settings, to participate in innovative activities. The research presented can be seen in Appendix B – paper 6.

3.6.1. INTRODUCTION

In the public organisations Innovative Work Behaviour (IWB) is considered extra-role behaviour that you should be compensated for, mainly because the innovation is approached top-down and the divergence between the employees' and the organisational goals contrary to private organisations (Dorenbosch et al., 2005; Janssen, 2005). Another main challenge in public-sector innovation is that the successful innovation often causes downsizing and reducing the number of employees, which, of course, does not motivate the employees in a broader perspective, to participate in innovative activities (Bysted & Jespersen, 2014). This

generates a dilemma of, who should be leading the changes in public organisation innovation, employees or management? The employees should be supportive and act as fireballs and promoters, but would the management be able to set aside the political perspectives in the decision-making, take the right decisions, lead the change, and take ownership of new innovations, even though it potentially could cause resistance from the organisation and employees. An incentive structure is considered an important asset in motivation employees to participate in innovation. One hazard with incentives and rewards in relation to innovation is concerned with the risk of the innovation not matching the expectations, or even turn into failure, hence, how should an innovation, that have failed, be rewarded, or should it maybe instead be punished, and what about the usage of resources in failed innovations? Sankowska (2013) adds that strong links between trust in management and organisation, knowledge creation, knowledge transfer, and innovativeness, must be present, and that distrust eventually can cause employees to turn focus towards production tasks, self-protection, and defensive behaviour, instead of engaging in innovation activities.

The findings in this research should also give insights to the research objectives highlighted in RQ3.

What strategy, management control system or organisational change should be established in order to generate and support an EDI culture within a governmental client organisation?

3.6.2. METHOD

The empirical data analysed in this research was the same as presented in section 3.3.2. In the present research the particular areas of interest were the consistent patterns of phenomena in relation to overall themes, or to specific mechanisms reoccurring in the dataset. The phenomena could be the behaviour or attitude of the participants during the discussions on the EDI related topics. The themes of interest were tendencies on drivers, obstacles and mechanisms, in motivating for, or using, EDI practices in the organisation, input to tools and methods, and cultural and managerial challenges. The findings from the content analysis can be found in full in Appendix B – paper 6. The themes identified were considered more overall thematic tendencies in relation to the different types of mechanisms, but the more specific mechanisms are elaborated in the following.

3.6.3. FINDINGS

The overall themes of mechanisms identified were:

- Support mechanisms
- Behavioural mechanisms
- Knowledge-sharing mechanisms
- Financial mechanisms
- Decentralisation mechanisms
- Participative mechanisms
- Transmission mechanisms
- Job design-learning mechanisms

Communication was highlighted as one of the most important tools and tasks throughout the entire innovation process. The frames of the innovative work should be communicated, and a decision-making procedure should be developed and agreed, by both employees and managers. A clear definition on the IWB as not being “extra-role behaviour”, should be integrated in either a HRM approach, or incorporated directly in the overall job-descriptions. Another interesting perspective was that the employee or individual related mechanisms had a relatively low priority in the data, particularly the employee rewards was not highly prioritised from the employees. Even though this scenario was somewhat unexpected, it had some convergence with the fact that financial mechanism sometimes can end up being counter-productive.

The management data highlighted an early definition of the selection criteria, as the overall dominant in evaluating ideas, thus, the alignment with the overall organisational goals was ensured before evaluation. Another activity that the management emphasised was a more practical and ad hoc approach to the selection process, not rigid and bureaucratic, which would have been expected.

The specific mechanisms identified, which in particular were important to conduct EDI in a governmental client organisation, and that somewhat differed from the general literature on innovation mechanisms, were:

Mechanisms on leading the changes and taking ownership

The roles of management and employees need to be defined explicitly. Based on this research the employees should be considered culture bearers and fireballs and lead the change at an employee level, but the managers should lead and take ownership of the change process.

Evaluation and decision-making mechanisms

The transparency in the decision-making process and the participating role of employees was important elements of this mechanism, to ensure that the employees will be involved in the decision-making procedures, and that decisions were not taken on beforehand. Simultaneously, the decision-making activities should be planned, with the selection criteria visible, and possible influencing bias from political perspectives clearly articulated.

Fast implementation and use of new innovations

Things tend to take time in public organisations, hence, when the innovation process reaches the implementation and anchoring phases, the process needs to proceed rapidly, to keep the news value and platform burning. Furthermore, one of the most important things was, once again, that the management should take ownership and responsibility of both the implementation and anchoring, as on the new innovation (product, process, service, etc.) in general. This include that the management must respond, naturally to the successes, but most importantly to the failures of new innovative approaches, it should not be the individual employees, who have to respond to innovation failures, not if they should keep contributing to the innovative activities, at least.

In the perspectives of converging and diverging mechanisms between employees and management, the main perspectives were on:

Organisation trust and innovation safety

Employees participating in innovative activities should have trust in the innovation process, and feel safe, when leaving organisational task to participate in innovation.

Organisational practice

The innovative behaviour should be well defined and the resources for innovative activities should be prioritised from the beginning. The level of flexibility in the systems and structures, and the level of autonomy should be supported by the applied organisational practices. Furthermore, the management should be aware of the possible tensions between employees participating in innovation, and those who do not. When applying innovative practices in the organisation, it must be acknowledged that innovation challenge existing procedures, which eventually could cause an organisational resistance against the new innovations. As organisational practices, this research emphasised the managerial behaviour, and in specific, the handling of some structural elements (e.g. rigidity of internal systems and structures, and the managerial control), and the overall communication related to the innovation process.

Recognitions and rewards

Not all employees have a desire to participate in innovative activities, hence the management must accept this fact, and focus on stimulating and motivation those, who will contribute.

Financial mechanisms

Financial mechanisms could have a negative effect on innovation (Georgellis et al., 2011). This research did not emphasise money or financial rewards as key mechanisms of motivation, or drivers, of innovation. However, a compensation design would be a key component of an organisational incentive structure, in which these designs could vary according to the type, and scope, of the different

innovations (Yanadori & Cui, 2013). The most important aspect of applying this type of reward was of that, it should be well-thought, and if the employees do not see this as an important mechanism, then it should be considered to only hold a symbolic value.

3.6.4. PARTIAL CONCLUSION

This research provided new insights in mechanisms that were essential in this particular area of research, but that were not fully elaborated in the research literature, at least not in this particular research context. These mechanisms were:

- **Mechanisms on leading the changes and taking ownership** – clarifying the roles of employees and management in the EDI innovation process.
- **Evaluation and decision-making mechanisms** – to ensure that decision-making activities are transparent for the employees and not too biased with political aspects and decisions already decided upon on beforehand.
- **Fast implementation and use of new innovations** – in public organisations, when new innovations are accepted, it is important to progress the implementation and anchoring of new innovation rapidly.

Furthermore, when elaborating on the applicability of an innovation process model for EDI in governmental client organisations, some attention should be directed towards the areas that generate and support an EDI culture in a governmental client organisation. The areas that were considered more important, based on the findings of this research were: *Organisational practices*, defining the innovative behaviour and the resources priorities for innovative purposes. *Recognition and rewards*, of the employees motivated to participate in innovation. *Financial mechanisms*, the employment should be well-thought, and these types of mechanisms should potentially only have a symbolic value or be designed in a compensation approach with outset in the affected employees.

A perspective that was not really resolved in this research was the dilemma of, how innovation failure and setback should be rewarded, with the element in mind that the employees still should be motivated to contribute to innovation on long-term basis. The findings discovered in this research were considered important in an innovations process approach to EDI within the case organisation, and should, thus, be incorporated in the framework, cf. section 3.4, with the purpose of enhancing the applicability.

3.7. AN INNOVATION PROCESS MODEL FOR EMPLOYEE-DRIVEN INNOVATION

Based on insight from the expert interviews, and the re-coding of data from the case study, the innovation framework was developed into a more applicable innovation process model.

3.7.1. INTRODUCTION

The main difference on the framework, cf. section 3.4.2, and the innovation process model presented here, was first and foremost the applicability. Where the framework highlighted the different methods, tools, roles, etc., the process model integrated some of the key mechanisms identified through the expert reviews and the case study findings. These mechanisms should give more insight into elements of an innovation process, which would trigger the innovation to happen in the case study context. The development of the innovation process should further add to answer RQ3:

How can strategy, management control system or organisational change be established in order to generate and support an EDI culture within a governmental client organisation?

3.7.2. INNOVATION PROCESS MODEL FOR EDI

The most important elements incorporated in the innovation process model, and here as enhancing the applicability of the model compared to the aforementioned framework, are presented here. The Innovation process model for EDI can be seen in Figure 3-3, and the full descriptions of individual sub-processes are presented in Appendix A.5 including some of the pitfall in innovation identified throughout the research.



Figure 3-3 Process model for EDI in the case organisational settings.

The design of the process was based on the acknowledgement that it is more important to design a generic process, which the organisation could become comfortable with, and that are scalable in terms of minor incremental or larger more radical innovations, than a specific process to each type of innovation.

An important asset of motivating the employees to engage in innovative activities was to ensure that the expected IWB was communicated and defined from the beginning, and further it should be clarified, how the different aspects of this behaviour are accounted for in the organisation. In addition to that, with the purpose

of creating some transparency for the employees that engage in innovation projects, the resources should be prioritising and granted at an early stage of the innovation process. Both of these aspects were integrated in the initial sub-processes, to ensure that it was highlighted in the beginning, in each new innovation project. The process model design should also ensure transparency of the decision-making process, which further assures that the premise of each evaluation is identical for all members of the evaluation committee (employees and managers), and no hidden agendas had too much influence on the idea selection. Furthermore, the award criteria should be clarified, and the meeting process of the evaluation committee, should be planned from the beginning.

In this process model a split perspective of preject and project was designed. Preject is related to the creative sub-processes in the model, which also contain the managerial aspects of innovation leadership, instead of innovation management. Project refers to the implementation and anchoring sub-processes, where it is more important with a more strict approach in terms of innovation management. This split perspective also touched upon the dilemma on, who should be leading the innovation. The model design was based on the approach that the preject could be lead by creative employees, but the project sub-processes should be managed by a member of the management, who also take ownership of the innovation. In public organisations the implementation and putting into practice, should be processed quite rapidly to ensure that the innovation is not left out or forgotten. This perspective emphasises the need for management ownership, and a more strict management in general, of these sub-processes.

A general theme in developing this process model was ensuring activities that should give the employee trust in both the organisation, and in the innovation process itself. Furthermore, the model should stimulate the organisational culture and the organisational practice to allow for a certain level of flexibility and autonomy in the problem-solving, to try new things, and to learn from the mistakes.

3.7.3. PARTIAL CONCLUSION

The main elements in the innovation process model, which separates it from the previously develop framework, are the more specific mechanisms that should remove the obstacles, which potentially causes the employees not to engage in innovative activities. The mechanisms were centred on a clear definition of the IWB, more transparency of the decision-making activities, clear prioritising of resources from the beginning, a higher level of involvement from the management in taking ownership and leading the change, and to process the implementation and anchoring stage rapidly. The design likewise has a spilt focus on the overall process, where the creative process, the preject, is driven by leadership, and the implementation and anchoring process, the project, is led more strictly by the

management. Furthermore, the description of the model, highlights some of the pitfalls that should be avoided, when approaching innovation, cf. Appendix A.5.

CHAPTER 4. CONCLUSION AND PERSPECTIVES

This research, on designing an innovation process model for conducting EDI in a governmental client organisation, with a project based organisation, and primarily operating in the Danish construction industry, gave some valuable insights, in both the practical and academic fields of research. The findings were based on a case study on a unique case in relation to innovation. Its originality was based upon the fact that the case organisation was both a public and governmental organisation, had a bureaucratic and hieratical project based organisational structure, had relatively highly skilled employees, and was operating within the construction industry. All of these aspects affected the conditions for conducting employee driven innovation, thus they had all to be accounted for in the design of an EDI process model, applicable to the case organisation.

It was found that, in general, within the case organisation that the motivation should be stimulated through management support in prioritising time for development and idea generation, but the curiosity, and the desire, to challenge the existing problem-solving processes should come from the newer and younger employees. Through the literature study the key activities identified were, the definition of an overall innovation strategy, identification of the motivation factors to stimulate employees to engage in innovation, balance the resources used in innovation and production related tasks, customisation of an innovation process model, and implementation of a more commitment-oriented HRM strategy.

The research on identifying the specific mechanisms provided both, mechanisms that were to a great extent elaborated in the research literature, and new insights to some of the gaps of the research literature, where the theoretical perspectives, in this particular area of research, were not fully elaborated. The more well-known mechanisms identified were, *organisational practices* in terms of defining the IWB and ensuring trust in both the organisation and the innovation process, *recognition and rewards* in terms of motivating and stimulating the employees, the latter further elaborated in terms of a *financial of compensational incentive design*. It was found that financial or salary rewards potentially could be counter-productive, and as such should be designed and applied carefully. The new insights that further added to the academic field of research were specifically:

The definition of the roles of management and employees specifically from the beginning, thus, a clear definition of who should be leading what in the innovation process, and who is responsible for what, and what the employees' role is.

The transparency of the decision-making process and in the participating role of employees, which is to ensure, that the employees are involved in the decision-making procedures, and that the selection was not decided upon beforehand driven by hidden or biased political agendas.

The implementation and anchoring phases of an innovation should be processed rapidly, in order to keep the news-value as high, and the 'platform burning', as much as possible. Simultaneously, the management should lead this change process and take ownership of the final innovation.

The abovementioned mechanisms were integrated into an innovation process model for conducting EDI, together with the theoretical perspectives identified through an extensive literature study, determinant, drivers and obstacles elaborated from semi-structured interviews and a case study, and finally input from interviewing experts. This EDI process model should hold a level of applicability not only in the case organisational context, but likewise in larger more bureaucratic project based organisations operation within the construction industry. Simultaneously the model is scalable in terms of incremental or radical innovation, whereas it is suitable for application on the 'low-hanging' fruits, for the organisation to gain experience with innovation on projects that have a higher rate of success

The contribution from this research was also evaluated by assessing the hypothesis proposed initially in the research process. The first hypothesis (H1) was concerned with some general perceptions on, how governmental, or public, organisations are challenged by the cultural settings in an innovation context. The latter part was the central element in this hypothesis, and the element that this research should test in terms of verification or falsification.

It is a common perception that governmental clients are facing considerable efficiency constraints that require that these organisations are agile and dynamic in both service and problem-solving, which is challenging, due to the culture of such public organisations.

Through this research some elements were discovered that provided insights into testing this hypothesis. From the pre-study, some challenges or obstacles for conducting innovation, in the case organisational settings, were identified. In general there were no incentives or motivation to engage in development of innovative activities directed towards the employees. The overall management focus was on production related tasks, and there was no formal or systematic approach to facilitate ideation or knowledge-sharing, those activities were often

driven by the availability of resources or spontaneity. It can roughly be concluded that the organisational culture, development and innovation were based on the individuals own beliefs, which often were rooted locally and not cross-organisational throughout the organisation. In public organisations, the lower-level management are often the first level of decision-makers in terms of prioritising resources to innovative activities, simultaneously this management group represent a considerable size within the organisation. Through the expert interviews it became clear that the lower-level management could be a significant obstacle, if the organisational target and the innovative targets were not aligned, whereas their motivation for transferring resources from production to innovation related tasks would be quite low.

The second hypothesis (H2) was directed towards the design and attributes of a successful EDI process model.

Employee-driven Innovation is a focus area to, on the one hand increase knowledge-sharing, creativity and involvement of employees, and on the other to ensure management systems and abilities to manage creative employees, and further, to generate continuous development and innovation from these creative contributions.

Through this research it was discovered that the development of an applicable EDI process model provides methods and tools to increase the level of knowledge-sharing by planning and articulating formal and informal activities, which further adds to the stimulation of the creativity, and the involvement of the employees. The developed process model, likewise, handles the involvement of employees in the innovative activities, in terms of clear definitions, roles, and planned activities. The involvement in both creative and decision-making processes should be transparent to the employees, where they have the possibility to weight-up the level of resources, and to assess if too many decisions are taken beforehand. The two main issues in terms of conducting EDI in the case organisational settings were the transparency of the innovation process in general, and the rapid processing of the implementation, and evaluation and anchoring of new innovations.

A perspective that was not really resolved in this research was the dilemma, of as to how innovation failures and setbacks should be rewarded, still with the thought in mind that the employees should be motivated to contribute to innovation on long-term basis. Klein et al. (2010) draws some perspectives on this topic, but in relation to EDI in public organisations, this is still an area that needs to be more elaborated.

REFERENCES

- Abernathy, W. J., & Utterback, J. M. (1978). Patterns of Industrial Innovation. *Technology review*, 80(7), 40-47.
- Adams, R., Bessant, J., & Phelps, R. (2006). Innovation management measurement: A review. *International Journal of management Reviews*, 8(1), 21 - 47.
- Alvesson, M., & Willmott, H. (2003). *Studying Management Critically*. London: Sage.
- Amar, A. D. (2004). Motivating knowledge workers to innovate: a model integrating motivation dynamics and antecedents. *European Journal of Innovation Management*, 7(2), 89-101.
- Bakker, A. B., & Demerouti, E. (2008). Towards a model of work engagement. *Career Development International*, 13(3), 209 - 223.
- Blaikie, N. (1993). *Approaches to Social Enquiry*. Cambridge Polity Press.
- Bogner, A., Littig, B., Menz, W., Klotz, A., Prakash, D., Kenworthy, L., & Hicks, A. (2009). *Interviewing Experts*. Hampshire, UK: Palgrave Macmillian.
- Bonnie, S. O. N., & Monica, A. (2007). Knowledge sharing and the psychological contract: Managing knowledge workers across different stages of employment. [DOI: 10.1108/02683940710745969]. *Journal of Managerial Psychology*, 22(4), 411-436.
- Buijs, J. (2003). Modelling Product Innovation Processes, from Linear Logic to Circular Chaos. *Creativity & Innovation Management*, 12(2), 76-93.
- Bysted, R., & Jespersen, K. R. (2014). Exploring Mechanisms that Influence Innovative Work Behaviour: Comparing private and public employees. *Public Management Review*, 16(2), 214-241.
- Christensen, C. M. (1997). *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail*. Boston, MA: Harvard Business School Press.
- Christensen, S., & Kreiner, K. (1991). *Projektledelse i løst koblede systemer*: Jurist- og Økonomforbundets forlag.
- Creswell, J. W., & Clark, V. L. P. (2007). *Designing and Conducting Mixed Methods Research*. Thousand Oaks: Sage Publications.
- Danermark, B., Ekström, M., Jakobson, L., & Karlsson, J. C. (2002). *Explaining Society. Critical Realism in the Social Science*. London: Routledge.
- Darsø, L. (2012). Innovation competency - An essential organizational asset. In Steen Høystrup et al. (Ed.), *Employee-Driven Innovation - A new approach* (pp. 108-126). London, UK: Palgrave Macmillian.
- de Sousa, F. C., Pellissier, R., & Monteiro, I. P. (2012). Creativity, Innovation and Collaborative Organisations. *International Journal of Organizational Innovation (Online)*, 5(1), 26-64.
- Dorenbosch, L., van Engen, M. L., & Verhagen, M. (2005). *On-the-job Innovation: The Impact of Job Design and Human Resource Management through*

- Production Ownership. *Creativity & Innovation Management*, 14(2), 129-141.
- Eriksson, P., & Kovalainen, A. (2008). *Qualitative Methods in Business Research*. London: SAGE Publications Ltd.
- Essmann, H., & du Preez, N. (2009). An Innovation Capability Maturity Model - Development and initial application. *World Academy of Science, Engineering and Technology*, 3(5), 399-410
- Flick, U. (2009). *An introduction to quantitative research*: Sage Publishing.
- Georgellis, Y., Iossa, E., & Tabvuma, V. (2011). Crowding Out Intrinsic Motivation in the Public Sector. *Journal of Public Administration Research and Theory*, 21(3), 473-493.
- Guba, E. G. (1981). Criteria for assessing the trustworthiness of naturalistic inquiries. *Education and Technology Journal*, 29(2), 75-91.
- Guba, E. G., & Lincoln, Y. S. (1994). Competing Paradigms in Qualitative Research. In N. K. D. Y. S. Lincoln (Ed.), *Handbook of qualitative research* (pp. 105-117). Thousand Oaks: CA: Sage.
- Hamel, G. (2006). The Why, What, and How of Management Innovation. *Harvard Business Review*, 84(2), 72-84.
- Hartmann, A. (2006). The role of organizational culture in motivating innovative behaviour in construction firms. *Construction Innovation*, 6(3), 159-172.
- Hobday, M. (2000). The project-based organisation: an ideal form for managing complex products and systems? . *Research Policy*, 29(7), 871-893.
- Høyrup, S. (2010). Employee-driven innovation and workplace learning: basic concepts, approaches and themes. *European Review of Labour and Research*, 16(2), 143-154.
- Janssen, O. (2005). The Joint Impact of Perceived Influence and Supervisor Supportiveness on Employee Innovative Behaviour. *Journal of Occupational and Organizational Psychology*, 78(4), 573-579.
- Johnson, P., & Duberley, J. (2000). *Understanding Management Research. An Introduction to Epistemology*. London: Sage.
- Kesting, P., & Ulhøi, J. P. (2010). Employee-driven innovation: extending the license to foster innovation. *Management Decision*, 48(1), 65-84.
- Klein, P. G., Mahoney, J. T., McGahan, A. M., & Pitelis, C. N. (2010). Towards a theory of public entrepreneurship. *European Management Review*, 7(1), 1-15.
- Koen, P., Ajamian, G., Burkhart, R., Clamen, A., Davidson, J., D'Amore, R., . . . Wagner, K. (2001). Providing clarity and a common language to the "fuzzy front end". *Research-Technology Management*, 44(1), 46-55.
- Kolb, D. A. (1976). Management and the learning process. *California Management Review*, 18(3), 21-31.
- Krefting, L. (1991). Rigor in Qualitative Research: The assessment of Trustworthiness. *The American journal of occupational therapy*, 45(3), 214-222.

- Leavy, B. (2005). A leader's guide to creating an innovation culture. *Strategy & Leadership*, 33(4), 38-45.
- Levy, Y., & Ellis, T. J. (2006). A systems Approach to Conduct an Effective Literature Review in Support of Information Systems Research. *Informing Science Journal*, 9, 181 - 212.
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic Inquiry*. Newbury Park, CA: Sage Publications.
- Manley, K., & McFallan, S. (2006). Exploring the drivers of firm-level innovation in the construction industry. *Construction Management & Economics*, 24(9), 911-920.
- Mansfeld, M. N., HÖLzle, K., & GemÜNden, H. G. (2010). Personal Characteristics of Innovators – An Empirical Study of Roles in Innovation Management [Article]. *International Journal of Innovation Management*, 14(6), 1129-1147.
- Miles, M. B., & Huberman, A. M. (1994). *Qualitative Data Analysis - An Expanded Sourcebook* (2nd Revised edition ed.): Sage Publications Inc.
- Muskat, M., Blackman, D. A., & Muskat, B. (2012). Mixed Methods: Combining Expert Interviews, Cross-Impact Analysis and Scenario Development. *The Electronic Journal of Business Research Methods*, 10(1), 9-21.
- O'Sullivan, D., & Dooley, L. (2009). *Applying Innovation*. USA: SAGE Publications, Inc.
- Onarheim, B., & Christensen, B. T. (2012). Distributed idea screening in stage-gate development processes. *Journal of Engineering Design*, 23(9), 660-673.
- Patton, M. Q. (1990). *Qualitative evaluation and research methods* (2nd ed.): Sage.
- Pittaway, L., Robertson, M., Munir, K., Denyer, D., & Neely, A. (2004). Networking and innovation: a systematic review of the evidence. *International Journal of Management Reviews*, 5/6(3&4), 137-168.
- Roozenburg, N. F. M., & Eekels, J. (1995). *Product Design: fundamentals and methods*: John Wiley & Sons, Chichester. Saren, M.A. (1984) A classification.
- Rowley, J., Baregheh, A., & Sambrook, S. (2011). Towards an innovation-type mapping tool. *Management Decision*, 49(1), 73 - 86.
- Sankowska, A. (2013). Relationships between organizational trust, knowledge transfer, knowledge creation, and firm's innovativeness. *The Learning Organization*, 20(1), 85-100.
- Shenton, A. K. (2004). Strategies for ensuring trustworthiness in qualitative research projects. *Education for Information*, 22(2), 63-75.
- Silverman, D. (2005). *Doing Qualitative Research*. London: SAGE.
- Tatum, C. B. (1986). Potential Mechanisms for Construction Innovation. *Journal of Construction Engineering & Management*, 112(2), 178-191.
- Tidd, J. (2001). Innovation management in context: environment, organization and performance. *International Journal of management Reviews*, 3(3), 169-183.

- Tidd, J., & Bessant, J. (2009). *Managing Innovation - Integrating Technological, Market and Organizational Change* (4th ed.): John Wiley & Sons, Ltd, West Sussex.
- Williams, P. R. (2011). Is Phase-Gate The Right Tool for the Job? – Next Practices in Innovation Management (pp. 1-30): American Institute for Innovation Excellence.
- Yanadori, Y., & Cui, V. (2013). Creating incentives for innovation? The relationship between pay dispersion in R&D groups and firm innovation performance. *Strategic Management Journal*, 34(12), 1502-1511.
- Yin, R. K. (2009). *Case Study Research - Design and Methods* (4th ed. Vol. 5): Sage.

APPENDICES

Appendex A.11
Appendex A.25
Appendex A.37
Appendex A.419
Appendex A.525

Appendix A.1

Assessment of research design

This appendix presents the assessment of the steps in the research design process with Guba (1981)'s criteria for trustworthiness of what Guba refers to as naturalistic or qualitative research (Krefting, 1991; Lincoln & Guba, 1985; Shenton, 2004).

STEP 1 – POINT OF REFERENCE	
Credibility	<p><i>Prolonged engagement</i> in terms of employment in the case organisation, thus, the researcher/investigator could get a sense of the perspectives and accustomed with the informants, and the informants could get a good relationship with, and trust in, the investigator.</p> <p><i>Reflexive analysis</i> to avoid a disturbing level of bias. The investigators role and involvement was assessed by the research group (supervisors).</p> <p><i>Triangulation</i> of data sources was applied through interviewing employees in different locations, at a different age, with different levels of experience, and with different types of employments.</p> <p><i>Peer examination</i> of data, analysis and findings through discussions with the research group.</p>
Transferability	<p><i>Democratic considerations</i> through a comparison of the informants (age, employment, location, experience, etc.) in relation to ensure a variety of the informants that simultaneously gave broader insights in the organisation and of the different employee profiles.</p>
Dependability	<p><i>Dense/thorough description</i> of the methods and process, and the characteristics of the respondents/informants.</p> <p><i>Peer examination</i> of methods, process, through discussions with the research group.</p>
Confirmability	<p><i>Triangulation of data sources</i> through interviewing different respondent with different characteristics</p> <p><i>Reflexive analysis</i> on the researchers influence on the process and the findings, to avoid bias and guided answers in the dataset.</p>
STEP 2 – LITERATURE REVIEW	
Credibility	<p><i>Peer examination</i> of the search and analysis process with fellow researchers</p>
Transferability	<p>- Not relevant in this step.</p>
Dependability	<p><i>Dense/thorough description</i> of the used methods and process, discussion of findings continuously throughout the process with other researchers as a peer examination approach.</p>
Confirmability	<p><i>Audit strategy</i> through an assessment of the process, data, findings, interpretations, etc by the research group.</p>
STEP 3 – CONDITIONS FOR AN EDI APPROACH IN THE ORGANISATION	
Credibility	<p><i>Prolonged engagement</i> through employment in the case organisation, to get a sense of the perspectives and a good relationship with, and earn trust from, the informants.</p> <p><i>Reflexive analysis</i> assessment from the related research group (supervisors) to handle possible perspectives of bias from the investigator.</p> <p><i>Triangulation of data</i> in terms of utilising the gaming approach on multiple units</p>

	<p>of employees and also managers in the case study.</p> <p><i>Peer examination</i> of gaming approach, design and process, through discussions with the research group.</p>
Transferability	<p><i>Democratic considerations</i> in terms of ensuring that employees from all levels of the organisation, with different employment and from the different regional offices were involved in the case study, but of course only if they were willing to. Thus, no one was forced to participate against their will.</p>
Dependability	<p><i>Dense/thorough description</i> of the case study research in general and of the gaming approach in particular, thus, other researchers have the possibility to reiterate the research.</p> <p><i>Peer examination</i> of the gaming approach, planning of activities, and selection of informants/participants by fellow researchers and methodological experts.</p>
Confirmability	<p><i>Reflexive analysis</i> on the researchers influence on the process and the discussions throughout the gaming activities and the findings, with the purpose of avoiding inappropriate bias.</p>
<p>STEP 4 – DEVELOPMENT AND TESTING OF EDI TOOLS AND OVERALL FRAMEWORK</p>	
Credibility	<p><i>Prolonged engagement</i> through employment in the case organisation, to get a sense of the perspectives and a good relationship with, and earn trust from, the informants.</p> <p><i>Reflexive analysis</i> assessment from the research group (supervisors) to handle possible perspectives of bias from the investigator.</p> <p><i>Triangulation of data</i> in terms of utilising the gaming approach on multiple units of employees and also managers in the case study.</p> <p><i>Peer examination</i> of gaming approach, design and process, through discussions with the research group.</p>
Transferability	<p><i>Democratic considerations</i> in terms of ensuring that employees from all levels of the organisation, with different employment and from the different regional offices were involved in the case study, but of course only if they were willing to. Thus, no one was forced to participate against their will.</p>
Dependability	<p><i>Dense/thorough description</i> of the case study research in general and of the gaming approach in particular, thus, the research was <i>auditable</i> to other researchers to an extent that they have the possibility to reiterate the research.</p> <p><i>Peer examination</i> of the gaming approach, planning of activities, and selection of informants/participants by fellow researchers and methodological experts.</p> <p><i>Re-coding</i> of data in relation to the data coding conducted in step 3.</p>
Confirmability	<p><i>Reflexive analysis</i> on the researchers influence on the process and the discussions throughout the gaming activities and the findings, with the purpose of avoiding inappropriate bias.</p>
<p>STEP 5 – SETTING UP THE OVERALL THEORETICAL FRAMEWORK</p>	
Credibility	<p><i>Triangulation of methods</i> used to design the input in the framework; semi-structured interviews, literature study, and case study with a gaming approach.</p> <p><i>Triangulation of data</i> was used to combine theoretical and empirical data in a framework of conducting EDI in the case organisation.</p> <p><i>Peer examination</i> of the different methods, tools, input, and output of the framework with the research group.</p>
Transferability	<p><i>Not relevant in this step</i></p>
Dependability	<p><i>Dense/thorough description</i> of both the different steps and phases of the</p>

	framework, and of the different methods, tools, input, and output of each main phase.
Confirmability	<i>Not relevant in this step</i>
STEP 6 – REVIEWING THE APPLICABILITY	
Credibility	<p><i>Reflexive analysis</i> to avoid a disturbing level of bias. The investigators role as quasi-expert and possible influence on respondent was assessed by the research group (supervisors).</p> <p><i>Triangulation of data sources</i> was applied through interviewing different experts with overlapping areas of expertise and different approaches to work with innovation.</p> <p><i>Peer examination</i> of the chosen experts, data, analysis and findings through discussions with the research group.</p>
Transferability	<i>Democratic considerations</i> through a comparison of the experts (background, employment, areas of expertise) in relation to ensure a variety in the experts' coverage of the framework's main themes.
Dependability	<p><i>Dense/thorough description</i> of the methods, data, and findings.</p> <p><i>Peer examination</i> of methods, process, through discussions with the research group.</p>
Confirmability	<p><i>Triangulation of data sources</i> through interviewing different experts with different background and different areas of expertise.</p> <p><i>Reflexive analysis</i> on the researchers influence on the answers from the experts and the findings, to avoid bias and guided answers in the dataset.</p>
STEP 7 – DEVELOPMENT OF AN EDI PROCESS MODEL	
Credibility	<p><i>Prolonged engagement</i> through employment in the case organisation, to get a sense of the perspectives and a good relationship with, and earn trust from, the informants.</p> <p><i>Reflexive analysis</i> assessment from the research group to handle possible perspectives of bias from the investigator.</p> <p><i>Triangulation of data</i> in terms of utilising the gaming approach on multiple units of employees and managers in the case study.</p> <p><i>Peer examination</i> of gaming approach, design and process, , and of the different methods, tools, input, and output of the innovation process model, through discussions with the research group.</p>
Transferability	<i>Democratic considerations</i> in terms of ensuring that employees from all levels of the organisation, with different employment, and from the different regional offices were involved in the case study, but of course only if they were willing to. Thus, no employee was forced to participate against their will.
Dependability	<p><i>Dense/thorough description</i> of the case study research in general, and of the gaming approach in particular, thus, the research was <i>auditable</i> to other researchers to an extent that they have the possibility to reiterate the research.</p> <p><i>Peer examination</i> of the gaming approach, planning of activities, and selection of informants/participants by fellow researchers and methodological experts. And further of both the different phases and sub-processes of the process model, and of the different methods, tools, input, and output of each main phase.</p>
Confirmability	<i>Reflexive analysis</i> on the researchers influence on the process and the discussions throughout the gaming activities and the findings, with the purpose of avoiding inappropriate bias.

Appendix A.2

Interview guide for semi-structured interviews

The interview should start with a brief presentation of research and candidate.

The present situation in the organisation, what is the point of departure for an EDI culture?

The interview guide is based on themes in RQ1:

Which distinctive characteristics in a governmental client project organisation should be considered in relation to developing innovation processes, and how does it affect the innovation capabilities?

Problem-solving process

How do you act, when you experience challenges and obstacles in relation to the defined working-processes (paradigms and guidelines)?

1. Do you strictly follow the guideline and paradigms, even though it is more troublesome?
2. Do you find your own way to work around these issues and continue the task?
3. Do you seek sparring from your closest colleagues to see if they have experienced the same challenges or obstacles?
4. Do you seek contact with your nearest manager, to inform that you feel that the tasks can be resolved in more suitable and optimised processes?

Do you reflect on your own work, and the experiences that you get? – And further, do you see room for breaking up bad habits and routines

Do you feel that the employees in general get involved in development work, and are motivated to contribute with ideas and suggestions for optimisation, when they experience challenges and obstacles from the existing paradigms or guidelines?

How do you co-operate in your team? – Do you solve problems cross-organisational? If so, what is the process?

Do you feel that employees are recognised in the organisation, when they put forward ideas and suggestions and would realise them in specific actions?

Gathering of experience data

Do you have specific activities that ensure employee's ideas and experiences are gathered and utilised in optimisation and development work?

Are the employees in general systematically and in broad involved in the development work, or is it random who contributes to development and innovation?

Do employees and managers prioritise time to evaluate problem-solving processes, project runs, and actually discuss if new initiatives and ideas could be successful?

Is there room for making mistakes and learn from one's mistake?

Management support

How do you feel that the nearest management and your colleagues grasp or react, if you question the problem-solving processes, or propose suggestions for improvements?

In general how does the management' and colleagues' react or see upon, if you fail when trying to implement and test new ideas?

Is there a common understanding in your team or section of the fact that development and implementation of new initiatives and innovations takes time?

Do you feel that the management in general has strong commitment in developing employee competences?

Does DDEIO have a development strategy that is explicit and clearly communicated, so that all employees know which areas that are prioritised?

Does DDEIO have a reward and incentive structure that support new thinking, creativity, and innovation?

Additional questions

How do you feel that the development process is organised and who are the main drivers?

What do you see as the main obstacles for the development being driven by the floor level employees?

Appendix A.3

Case study data

This appendix shows all the empirical data from the case study research and further gives examples on how the content analysis were conducted.

Themes from exploratory case study - employees

In the following the primary data, game cards, are thematised with outset in an open-minded approach, where focus is on general organizational and managerial elements, methods, skills, etc., and the secondary data, from parking schemes and observations are clean. The approach is based on comparing the same strings from each game. Hence all three groups of data from 1th round and 1 string in each of the three games are thematised.

Themes from each 1th round, 1st string incl. note schemes and observations

From game cards:

- Communication of the task and the overall strategic approach (3 cards)
- Organizing seminars and workshops to stimulate ideation (2 cards)
- Providing ideas are nonsense, the decisions are already made by top management (2 cards)
- Seminars and workshops are too unstructured and are missing vision, if the EMP (employees) doesn't know the background they will be negative to ideation and development from day 1. (1 card)
- EMP need more influence on tasks and organizational development (1 card)

From note schemes:

- Know and understand the needs
- Important for EMP to feel secure and have trust in the organisation
- Use of professional organisations
- Avoid too much information – only necessary information should be communicated
- Promote agility and willingness for change
- Too many rules and terms of conditions
- Too confusing
- The future is instable and insecure

From observations:

- Taking the individual EMP under consideration giving them influence in organizational changes
- More integration between management and EMP in the decision-making process to avoid too many top-down decisions.

- Not all EMP desire more influence on decision-making
- Testing EMP to identify what motivates them
- Organisational trust – the EMP would cause a direct staff cut
- Lacking motivation – the decision are already made on before hand
- Communication is important to document the necessity of EMP input
- The participants in the game commit themselves from the beginning. Possible because the limitation of time in each round.
- The participants speak of solutions based on what situation they would prevent, they doesn't think freely and out of the box.
- The game rules needs to be framed or a reference point need to be clarified. Sometimes they have a hard time understanding each other.

Themes from each 1th round, 2nd string incl. note schemes and observations

From game cards:

- EMP problems and suggestions are not recognized by upper management (2 cards)
- Better planning and management focus – formalized process (2 cards)
- Anchoring at strategic level and in the strategic planning – higher priority in the daily routines (2 cards)
- Formalized meeting process with informal collegial knowledge-sharing (1 card)
- Approach the nearest manager (1 card)
- Meetings; internal, network, knowledge-sharing (1 card)

From note schemes:

- Process and planning are described on paper and communicated properly
- Media platforms
- Technical challenges
- Too succeed it must be prioritised
- Appointment of moderator or process responsible
- Scheduled meeting routines
- Two levels of meetings – management driven and EMP driven
- Things tend to take time
- Difficult to gather people
- Lacking of trust or reliability to colleagues expiring and knowledge – “who knows best?”
- Professional level in meetings is too low
- EMP keep knowledge to themselves

From observations:

- Open offices where you can share your problems with at broad range of colleagues.

- Problems and suggestions for improvement are handed in, in a written format, and handled in meetings one by one.
- The context is the main driver for involvement and participation

Themes from each 1th round, 3rd string incl. note schemes and observations

From game cards:

- Judgement or decision-making committees (4 cards)
- Process descriptions must be clear to avoid conflict between EMP and management. (2 cards)
- Involving too many people in decision-making is time-consuming (1 card)
- A specialist or professional committee can overlook the real motive behind the idea or optimising suggestion (1 card)
- Brainstorm process (1 card)

From note schemes:

- Work group with a mixture of EMP and management
- Voting between EMP and management – a majority decision
- A draw decision – randomly a backup plan
- Reject ideas based on suppression
- Keeping ideas close due to shyness or timidity
- Final decision-making – important role
- Involvement of idea owner to clarify background information
- Uncovering of hidden agendas though reference groups
- Subjective evaluations
- Lacking feed-back
- Lacking resources
- Final decision in the management group
- Final decision made by head of task
- Use of external consultants

From observations:

- Digital vote between EMP – with a subsequent process of committee discussion
- Seriousness is important

Themes from each 2nd round, 1st string incl. note schemes and observations

From game cards:

- Communication of possibilities and interests (2 cards)
- Appointment of passionate employees (fireballs) who can promote ideas (2 cards)
- Focus on obstacles and improving opportunities in the daily working processes – Lean approach (2 cards)
- Resistance against change (1 card)

- Lacking resources (1 card)
- Professional development and education of EMP (1 card)

From note schemes:

- Targeted resources
- Difficulty in convince other EMP on new ideas
- Financial or salary oriented benefits
- Management support is crucial
- LEAN management as a KPI
- Highlight advantages
- Identify and make needs and effects visible
- Highlight the advantages – Recognition, empowerment and influence
- Huge need for recognition
- New tool and methods must create more value
- Project owner should take ownership of new tool and methods
- Not feeling the need or no one making any demands
- Geography is considered an obstacle
- Prioritised on an overall strategy
- Apply the Competence Development Foundation for contributions
- Apply for a new PhD to facilitate and lead the implementation

From observations:

- Recognition and empowerment of employees
- EMP skills – motivation, empowerment from management, idea promotion, business case thinking
- Management support and engagement
- Professional development as driver for motivation

Themes from each 2nd round, 2nd string incl. note schemes and observations

From game cards:

- More active focus from management – leading the changes (3 cards)
- Personal EMP benefits (1 card)
- Lacking follow up and consequences – doing business as usual (1 card)
- Seminar and meetings (1 card)
- EMP education (1 card)
- Resources are important – time and prioritising (1 card)
- No feeling of necessity – just another bureaucratic element (1 card)

From note schemes:

- Difficult to plan for creativity – always handed new tasks
- What do we measure? – more focus on the important targets
- Courses and training could motivate through working with examples
- Support teams

- EMP present ideas/suggestions for change
- More professional and/or digital solutions
- Paradigms to facilitate the process – make the process simpler
- Making the performance a part of the salary negotiations
- EMPs’ upgraded skills should be demanded used in the daily work
- Start new tools by pilot projects
- Ensure a red line through an overall strategy
- Paradigms and schemes is a straitjacket

From observations:

- Shifting methods and routines makes difficult to feel the need and take ownership for changes
- Support teams
- Sending people on motivating courses
- Time is always an issue
- New organisational changes are often keyed up and prioritised in the beginning, and later before completed there are reprioritised

Themes from each 2nd round, 3rd string incl. note schemes and observations

From game cards:

- Dynamic knowledge-sharing groups (2 cards)
- Dynamic work assignment – rotation from location to location (1 card)
- Geographical diversity is challenging meeting participation (1 card)
- Showing the good story – best case (1 card)
- Development of guidelines and paradigms (1 card)
- Lacking understanding is an obstacle for using new tool and methods (1 card)
- Look for the “win-win” situation, when assigning EMP (1 card)
- Commitment to preparation, participation, and reflection (1 card)

From note schemes:

- More active management
- Financial challenges in dynamic working routines
- Personal or social challenges in dynamic working routines
- Education and follow-up on EMPs’ new competencies
- Prioritise money to projects
- Hire in external consultants to facilitate the process
- Lacking management support
- Cooperation between two groups, teams, etc. Could be challenging

From observations:

- Combine knowledge-sharing with education of EMP
- Knowledge-sharing on several levels – working, discussion, informing

- Geography is often an obstacle for cross-disciplinary knowledge-sharing
- Dialogue based approach to new- or reassignments or organisational changes.
- In general the participant tend to focus a lot on resources and what is reasonable
- They don't think "out of the box", many ideas and solutions are based on what obstacles you would avoid. This effect the output in a way that most ideas are based on negative elements
- The focus is also on "covering my ass" thinking, hence no risk taking
- The participants' open minded approach and engagement in the game varies
- 9 out of 11 are actively participating in the group discussions.

Evaluation comments:

- Some of the participants in the 3rd game have been involved in developing and implementation of new tool and methods, and there could be exposed for criticism of their work, during the discussions on obstacles and ideas.
- The feed-back on the gaming approach is overall positive
- The psychical element of the game caused a higher level of interest and involvement
- The game structure with limited time to discuss turned out to be positive in terms of driving the process and generating output
- All participants seemed to contribute in the discussions, and they were heard in the process.
- Comment from a participants: "There are no new obstacle or ideas/solutions on the table that haven't been spoken or considered before", "The brainstorm approach doesn't really solve anything, a more analytic approach and thoughtfulness would probably give better or more creative results"

Themes from exploratory case study - management

Themes from each 1th round, 1st string incl. note schemes and observations

From game cards:

- Communication and involvement of EMP
- Making information and knowledge available for EMP pull when needed instead of MAN push occasionally
- Keeping the process running – even though it are demanding

From note schemes:

- Rewards (salary, education)
- Open communication to enhance involvement
- Grant more involvement

- Communication on the overall strategy
- Communication on highlighting the positive benefits
- Balance between innovation space and framework
- The innovation process could be jammed by itself.
- Keep the burning platform through a long innovation process
- Keep focus on the communication plan.

From observations:

- The EMP need should define the level of communication
- Good discussion on how long processes (time consuming) drain EMP energy and result in a more inconsequential attitude
- Not as many management perspectives as expected, but instead a lot of practical EMP perspective
- Intro question: “outset in our everyday life or in an optimal ‘world’”
- Some groups start with a lot of ideas but less focus on argumentation
- Some group members are very reluctant in the discussions
- Those who are normally outspoken dominates
- When a practical skill is needed, the group member with that skill contributes
- The often end out with a suggestion on appointing a committee
- After the first round of discussion the groups get a better understanding on the game and the discussion are increasing and more ideas are presented
- Later in the first round of play, a sense of indifference are surfacing in some of the groups
- The MANs often discuss with outset in them being EMP and not MAN. They speak about decision-makers as they or them, and not us!

Themes from each 1th round, 2nd string incl. note schemes and observations

From game cards:

- Knowledge-sharing in formal and informal groups
- Lacking commitment in knowledge-sharing
- Work overload is hindering

From note schemes:

- More EMP involvement in group work
- Management prioritise time to participate
- More attention and support from management
- EMP groups participate in the development work
- Informal networking
- Formalised Knowledge-sharing groups
- EMP sees knowledge-sharing groups as an elitist environment
- Communication through email
- Idea box to collect ideas to optimisation and improvement suggestions

- Committee that monthly evaluate incoming ideas

From observations:

- The MAN from development section creates a lot of solutions, but they are challenged by the practitioners in the group.
- EMPs have a competition mentality, and will not show 'weakness' by the fact that they have problems

Themes from each 1th round, 3rd string incl. note schemes and observations

From game cards:

- Award or selection criteria
- Appointment committee – broad professional competencies
- Biased scoring of selection criteria

From note schemes:

- Scoring ideas in evaluation is subjective/biased
- Rating criteria must be unambiguous
- EMP involvement in decision-making on ideas
- Award criteria
- Management controlled decisions
- Assessment system
- Democratic selection and evaluation
- Draw straws on ideas and suggestions
- Different culture in organisation
- Elitist network
- Physical distance between EMP
- EMP should be able to pull suitable information out of the system as they need it

From observations:

- Subjective rating of ideas
- Practical committees instead of broader elected committees.
- Selection of ideas is difficult to actualize, group sticks to well-known solutions

Themes from each 2nd round, 1st string incl. note schemes and observations

From game cards:

- Communication of necessity, advantages and added value
- Detailed communication plan
- Lacking communication – the right messages never reach the right people

From note schemes:

- Ensuring development and adjustments through project management

- Highlight necessity
- Focus on added value
- Resistance against change
- Establishment of project groups could cause ideas to fall into oblivion
- Something similar has already been tried out, but failed.
- Communication strategy

From observations:

- Idea owner or idea owner's MAN should take the initiative and promote
- You should always have a plan for the communication
- Articulate the needs from upper MAN – basic learning from PM education
 - The person from upper MAN doesn't agree with the group, they repeat
- One of the members left during the game break
- The person from upper MAN jokes "in our division we don't motivate, we give orders"
- A group agrees that the game set-up has some similarities with 'the work group' process in the organisational changes approach
- Reflection on how the fact that better communication actually can benefit our organisation
- Focus on well known and used tools and methods
- The development and implementation stages are tangible - more concrete
- One of them group members speak as if he is a MAN, and HE should do something
- In general there is no critique of the management, the upper management or the board of directors!
- Some participants 'play' the game, as if it is a fictive world, not their reality
- On participant mention MAN and EMP as 'others' in 3rd person

Themes from each 2nd round, 2nd string incl. note schemes and observations:

Game cards:

- MAN should create a demand
- MAN support
- Effort higher than profit

From note schemes:

- Develop directives for implementation
- Education of EMP
- Not clear communication from MAN
- Peer-to-peer training between EMP
- Fast implementation and use
- Lacking abilities to promote ideas

- Not able to create the right context to reach EMP
- Visualizing that a new tool will ease the daily working processes
- Create a real need
- Clear framework and organising of implementation process

From observations:

- Generate a feeling of necessity amongst MAN and EMP
- If the MAN doesn't see any necessity it could lead to a failure.
- Focus on organising, framing the process, limit the working conditions
- The MAN-group must support the process
- During the discussion the pronouncement of the doers is shifting, us, them, you, one, etc.
- The groups joke: "we should send out an email with directives"

Themes from each 2nd round, 3rd string incl. note schemes and observations:

Game cards:

- 'Best practice' teams/departments that inspire the organisation
- Culture bearers that lead the changes supported by MAN
- Resources are a limitation

From note schemes:

- Anchoring through common workshops
- EMP (fireball) travels the organisation and present
- Anchoring should be MAN response
- Knowledge-sharing
- Network groups with all teams represented
- Network groups requires many resources
- MAN travelling the organisation is time consuming
- MAN driven implementation reduces EMP ownership
- Newsletter
- Create time and space for deeper involvement
- Internet Q&A

From observations:

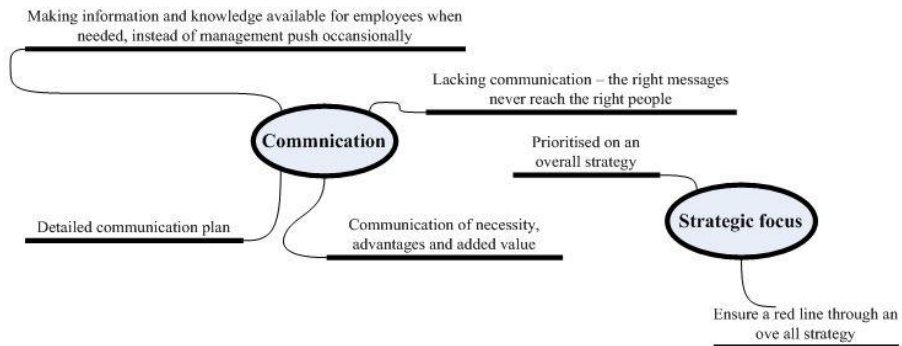
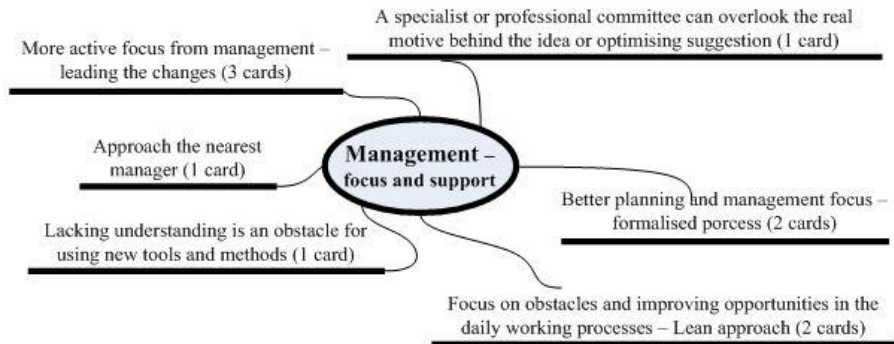
- Planning and resource management is an important success criterion
- Culture bearer/fireball should lead the changes – with MAN-support
- MAN should create space through communication and a strategic focus
- The participants often want to compare with 'role model' or 'best practice' organisations
- Not much self criticism on the MAN roles and their activities
- The discussions are taking place in 3rd person... some should do something ... the MAN should do something (meaning it's themselves)
- The focus should not come from MAN, the EMP should motivate and lead

- The discussion are very tool-oriented... do like this... make a plan..., There is basically not any suggestions on MAN and strategic perspectives -> they approach the practical 'problem', not thinking in a bigger picture

Evaluation comments

- Lacking coffee and snacks have an impact on the latter stages of the game, this could lead to less ideas on the parking schemes

Examples on content analysis and theme coding



Appendix A.4

Description of innovation framework

The different phases of the innovation framework are described step by step, and each of the sub-processes, phases and surrounding elements are described by; focus, input/output, tools and methods, and the competences that are central to complete each part successfully. The different elements of the framework is described in the same colour code as they appear in the model.

Strategy

Input:

Organisational challenges from the surroundings.

The desired or realistic level of changes and expectations to the innovation approach (incremental, radical, process, product, etc.)

Awareness of the resources and level that are demanded, when implementing and starting up and innovation process.

Output:

Placing employees, ideas and knowledge in the centre of the management philosophy.

Encouraging employees to share knowledge and experiences

Defining the level of the organisational approach to innovation, the targets, and the overall expectations.

Definition of the overall innovative behaviour

Decision on an incentive structure to stimulate the desired innovative behaviour

Level of involvement of employees in the decision-making

Tools and Methods:

Strategic analytical tools (e.g. SWOT-analysis)

Commitment-oriented HRM-strategy that focuses on employment of employees with competences and skills in innovation and development, and who also have a higher tendency to commit themselves to a 'on-the-job-innovation' behaviour and to becoming culture bearer and fire balls.

Roles and Competences:

Willingness to make the strategic decisions that are time consuming and resource demanding, but generate the long term profit.

Systems and Structures

Systems, Tools and Methods:

Framework for systematic knowledge-sharing, formal and in-formal.

Tools for collecting ideas and improvement proposal electronically

Formalised innovation process that allows the employees to step out of the basic organisation and into an innovation- and development project

Prioritised process or innovation facilitator/manager, who is responsible for moving the innovation process forward continuously.

Culture

Focus areas, Roles and Competences:

Open culture with less bureaucratic elements

Motivation of employees through trust, recognition, rewards, and involvement.

Development of employees' competences according to the employees' wishes, the challenges in the daily problem-solving processes, and to the strategic guidelines.

Implementation of the acquired competences in the future problem-solving.

Definition of incentives and factors to motivate the employees to get involved in the innovation process

Management support to employees in challenging the existing working processes and procedures

Openness and trust at all levels across the organisation

Acceptance of employees making mistakes, and that the organisation articulates and learns from the mistakes.

Highlighting the importance of ideation and knowledge-sharing across the organisation

Stimulation of a culture of curiosity with room and possibilities for experiments on improvements of processes, tools and in general in the daily problem-solving.

Ideation

Input:

The employees' knowledge (both the tacit and spoken), competences and experience.

Innovation process information on and communication of terms and conditions from the management

Output:

Explicit ideas and improvement proposals on existing or new problem-solving processes, tools, methods, etc.

Tools and Methods:

Formal knowledge-sharing in networks, groups, meetings, workshops, etc.

Informal knowledge-sharing

Workshops directed towards brainstorm and innovation sessions

Systematic collection of ideas and knowledge

Storing and sorting of ideas

Roles and Competences:

Management should prioritise time for ideation and innovation approaches

The general management (and/or innovation management) should:

- Prioritise and initiate knowledge-sharing activities
- Support and motivate employees to think 'out-of-the-box'
- Motivate employees to suggest new ideas and proposals on improvement
- Encourage employees to challenge the existing tools, methods and problem-solving processes

Innovation management:

- Evaluate when there is a sufficient number of ideas, or if the right ideas are present to proceed to the next phase.
- Coordination of phase output and the innovation strategy
 - Are the output and the innovation process so far according to the overall strategic goals?

Idea selection

Input:

Ideas and improvement suggestions

Output:

Concept description of ideas and/or improvement suggestions that fulfil the criteria:

1. Is according to the overall Innovative framework
2. There is a real need and rationale
3. Predefined success criteria for implementation and use.
4. The sufficient resources to develop, implement and anchor are available in the organisation

A project mandate describing the terms and conditions for using resource and the extent of the innovation should follow each idea
Predefined innovation team prioritised to continue the innovation process from development to evaluation and anchoring

Tools and Methods:

Evaluation committee of employees and managers

Evaluation schemes based on the criteria to ideas and improvement suggestions based on previous output

Evaluation meetings for selection of ideas or improvement suggestions

Letting the idea owner present the idea to evaluation committee either by personal presentation or written

Communication of reasons to include and exclude ideas

Roles and Competences:

Competences to define and prioritise time and resources to selection of ideas

Decision-making competences to initiate the next sub-process

Innovation management should ensure the planning of the process

Knowledge and competences to describe and assess the scenarios and potential of ideas and/or improvement suggestions

Development

Input:

Concept description of ideas and/or improvement suggestions

Employees/resources to include in the innovation teams that should complete the innovation project

Output:

Realisable tools, methods, processes, improvements etc. that are according to the overall innovation framework.

Strategy for implementation

Tools and Methods:

Creative workshops to develop, test, adjust, and simulate the use of new tools and methods.

User interviews

Technologies, systems, and structures to ensure that the concept is as operationalisable as possible.

Running tests, feedback, and sparring from support teams.

Involvement of professional competences

Roles and Competences:

Development competences within the selected ideas field of application, if they are not present in-house, they can be brought in.

To ensure anchoring of the intended purpose of the idea the developer or idea owner can be include in this part of the process.

The innovation management should manage the process and ensure that the development is according to the guidelines in the project mandate.

With the purpose of generating promoters and fireballs the idea owner should as far as possible be included in the development process

Implementation

Input:

Project or concept that is ready for implementation.
Concrete implementation plan based on the strategy
Information and guidelines on process, resources, and expected results

Output:

The new innovation (tool, method, process) is broadly implemented in the organisation
KPI and targets measurement schemes to evaluate the use and innovation potential (based on the predefined success criteria)

Tools and Methods:

Strategic planning tools to plan the implementation process
Guidelines, instructions and presentation tools.

Roles and Competences:

Knowledge on processes and implementation strategy
Management competences to support and promote the new innovation during the presentation and implementation phase
Teaching and instruction competences

Evaluation and Anchoring

Input:

Implementation plans/strategy from previous sub-process
KPI and evaluation schemes

Output:

Assessment on if success criteria are satisfactory fulfilled
Learning from this innovation project/process to adjust the overall process
Final decision on whether the innovation should be permanent or it should be further developed or adjusted

Tools and Methods:

KPI measurement schemes
Follow-up interviews on user and experts
Analysis and evaluation reports

Roles and Competences:

Management competence to evaluation of if the new innovation fulfil the success criteria in the project mandate and further if it should be permanent
Competences and resources to ensure that new innovation are used, and the organisation doesn't fall back to "the-way-we-used-to-do"

Innovation management

Tools and Methods:

Project and process management tools

Communication tools

Roles and competences:

Promotion and support of new ideas and improvement suggestions

Project and process management competences to gather the right innovation team to move new ideas into added value and profit

Decision-making competences and an organisational network that ensure the ability to make quick decisions when ever needed

Communicative abilities to communicate strategy, possibilities, and priorities up- and downwards in the organisation

Creating the right balance between innovation and production tasks

Understanding of benefit from internal knowledge and network in the planning and development of organisational changes

The innovation management should entail:

- Motivation of employees to generate new ideas and improvement suggestions
- Transform tacit knowledge and experience into explicit and spoken and shared knowledge
- Ensure that the right knowledge reach the right people in the organisation
- Ensure that new knowledge are shared across the organisation
- Encourage the employees to challenge the existing tool, methods, problem-solving processes, etc.
- Evaluation of, when the amount of ideas or the right ideas are present and the process should move on.
- Ensure that the innovation process are continuously running by removing obstacles, and ensuring that the right decisions are made at the right time between the main processes
- Ensuring the overall management support in the innovation process

Appendix A.5

Description of the innovation process model

The different phases of the innovation framework are described step by step, and each of the sub-processes and surrounding elements are described by input and output, tools and methods, roles and competences, and general focus areas.

Strategy

Input:

Organisational challenges from the surroundings.

The desired or realistic level of changes and expectations to the innovation approach (incremental, radical, process, product, etc.)

Awareness of the resources and level that are demanded, when implementing and starting up and innovation process.

Output:

Communication of the organisations innovation targets to all levels of the organisation

Placing employees, ideas and knowledge in the centre of the management philosophy.

Encouraging employees to share knowledge and experiences

Defining the level of the organisational approach to innovation, the targets, and the overall expectations.

Clear definition of the expected innovative work behaviour, e.g. as a part of the overall HRM strategy of the organisation

Design of on an incentive structure or compensation model to stimulate the desired innovative behaviour and that apply to all level of employees.

Innovation experience could be achieved by taking outset in the "low-hanging fruits"

Approaching innovation through more complex problem-solving of reoccurring challenges

Tools and Methods:

Strategic analytical tools (e.g. SWOT-analysis)

Commitment-oriented HRM-strategy that focuses on employment of employees with competences and skills in innovation and development, and who also have a higher tendency to commit themselves to a 'on-the-job-innovation' behaviour and to becoming culture bearer and fire balls.

Roles and Competences:

Willingness to make the strategic decisions that are time consuming and resource demanding, but generate the long term profit.

Systems and Structures

Systems, Tools and Methods:

Framework for systematic knowledge-sharing, both formal and in-formal.

Tools for collecting ideas and improvement proposal electronically

Formalised innovation process that allows the employees to step out of the basic organisation and into an innovation- and development project

Prioritised process or innovation facilitator/manager, who is responsible for moving the innovation process forward continuously.

Clear framing of the innovation process

Apply elements of SCRUM to facilitate the shorter and more focused steps in the creative sub-processes of the innovation process

Systematic approach to store and share knowledge and ideas across different locations within the organisation.

From the beginning there should be a clear and explicit definition of the managements' and the employees' roles in the innovation process

Decision-making throughout the innovation process should be well planned and transparent in terms of roles and selection criteria.

Organisational practices that support the level of flexibility in the systems and structures and the level of autonomy should be applied.

Culture

Focus areas, Roles and Competences:

Open culture with less bureaucratic elements

Motivation of employees through trust, recognition, rewards, and involvement.

Development of employees' competences according to the employees' wishes, the challenges in the daily problem-solving processes, and to the strategic guidelines.

Support from management to create a certain level of security of the employees' main task, when participating in innovative activities.

Implementation of the acquired competences in the future problem-solving

Definition of incentives and factors to motivate the employees to get involved in the innovation process

Management support to employees in challenging the existing working processes and procedures

Openness and trust at all levels across the organisation

Acceptance of employees making mistakes, and that the organisation articulates and learns from the mistakes.

Highlighting the importance of ideation and knowledge-sharing across the organisation

Stimulation of a culture of curiosity with room and possibilities for experiments on improvements of processes, tools and in general in the daily problem-solving.

The organisational culture should ensure that the employee have trust in the innovation process, and feel safe, when leaving organisational tasks to participate in innovative activities.

Ideation – project

Input:

The employees' knowledge (both the tacit and spoken), competences and experience.

Innovation process information on and communication of terms and conditions from the management

Output:

Explicit ideas and improvement proposals on existing or new problem-solving processes, tools, methods, etc.

Tools and Methods:

Formal knowledge-sharing in networks, groups, meetings, workshops, etc.

Informal knowledge-sharing

Workshops directed towards brainstorm and innovation sessions

Systematic collection, storing and sorting of ideas and knowledge

Plan innovation activities in shorter and more focused steps, with clear targets, and a more transparent process and need of resources.

Roles and Competences:

Management should prioritise time for ideation and innovation approaches

The general management (and/or the innovation leader) should:

- Prioritise and initiate knowledge-sharing activities
- Support and motivate employees through recognition and trust to think 'out-of-the-box'
- Motivate employees to suggest new ideas and proposals on improvement
- Encourage employees to challenge the existing tools, methods and problem-solving processes

Innovation leadership:

- Evaluate when there is a sufficient number of ideas, or if the right ideas are present to proceed to the next phase.
- Routinising of the ideation process throughout the organisation
- Coordination of phase output and the innovation strategy
 - Are the output and the innovation process so far according to the overall strategic goals?

Idea selection – preject

Input:

Ideas and improvement suggestions

Output:

Criteria should be agreed upon on beforehand, but concept descriptions of ideas and/or improvement suggestions should fulfil the criteria:

1. Is according to the overall innovative framework
2. There is a real need and rationale
3. Predefined success criteria for implementation and use.
4. The sufficient resources to develop, implement and anchor are available in the organisation

A project mandate describing the terms and conditions for using resource and the extent of the innovation should follow each idea

Predefined innovation team prioritised to continue the innovation process from development to evaluation and anchoring

Tools and Methods:

Evaluation committee of employees and managers that both have agreed on the procedures and selection criteria

Evaluation schemes based on the criteria to ideas and improvement suggestions based on previous output

Evaluation meetings for selection of ideas or improvement suggestions

Letting the idea owner present the idea to evaluation committee either by personal presentation or written

Communication of reasons to include and exclude ideas

Roles and Competences:

Competences to define and prioritise time and resources to selection of ideas

Experience with decision-making in innovation

Innovation management should ensure the planning of the process

Knowledge and competences to describe and assess the scenarios and potential of ideas and/or improvement suggestions

Development – preject/project

Input:

Concept description of ideas and/or improvement suggestions

Employees/resources to include in the innovation teams that should complete the innovation project

Output:

Realisable tools, methods, processes, improvements etc. that are according to the overall innovation framework.

Strategy for implementation

Tools and Methods:

Creative workshops to develop, test, adjust, and simulate the use of new tools and methods.

Involvement of the basic organisation in an iterative design process

User interviews

Technologies, systems, and structures to ensure that the concept is as operationalisable as possible.

Running tests, feedback, and sparring from support teams.

Involvement of professional competences

Roles and Competences:

Development competences within the selected ideas field of application, if they are not present in-house, they can be brought in.

To ensure anchoring of the intended purpose of the idea the developer or idea owner can be include in this part of the process.

The innovation management should manage the process and ensure that the development is according to the guidelines in the project mandate.

With the purpose of generating promoters and fireballs the idea owner should as far as possible be included in the development process

Implementation – project

Input:

Project or concept that is ready for implementation, based on the strategy
Information and guidelines on process, resources, and expected results

Output:

The new innovation (tool, method, process) is broadly implemented in the organisation
KPI and targets measurement schemes to evaluate the use and innovation potential (based on the predefined success criteria)

Tools and Methods:

Strategic planning tools to plan the implementation process, including analysis of potential risks for resistance against change.
Guidelines, instructions and presentation tools.
Communication and articulation of potential benefits of the new innovation
Routinising of new innovations.
Implementation should be initiated and processed rapidly

Roles and Competences:

Knowledge on processes and implementation strategy
Management competences to support and promote the new innovation during the presentation and implementation phase
Teaching and instruction competences
The management perspective should change towards a stronger management
The innovation management must keep the initiative and ensure that the implementation is processed fast.
Management should lead the change and take ownership of the implementation process

Evaluation and Anchoring – project

Input:

Implementation plans/strategy from previous sub-process
KPI and evaluation schemes

Output:

Assessment of the success criteria – are they satisfactory fulfilled?
Learning from this innovation project/process to adjust the overall process
Final decision on whether the innovation should be permanent or it should be further developed or adjusted

Tools and Methods:

KPI measurement schemes, including time and finances.
Follow-up interviews on user and experts, and analysis and evaluation reports
Use of Quality Management to assess the measurable parameters and documentation of usage
An important element of ensuring that the innovation is able to reach the potential is to ensure proof of scale
Highlight the positive results and tell “the good stories” on many levels in the organisation
Promoters, culture barer, and fireballs are important, and should continuously keep promoting the idea and innovation
Evaluation and anchoring should be initiated and processed rapidly after the implementation is completed

Roles and Competences:

Evaluation of, if the new innovation fulfil the success criteria in the project mandate and further if it should be permanent
Competences and resources to ensure that new innovation are used, and the organisation doesn't fall back to 'the-way-we-used-to-do'
Management should lead the change and take ownership of the evaluation and anchoring and respond to the outcome (success/failure)

Innovation leadership and Innovation management

Tools and Methods:

Project and process management tools

Communication tools

Roles and competences:

Recognise when there is a need for innovation leadership, and when there is a need for innovation management.

Competences within creative leadership

Promote and support of new ideas and improvement suggestions

Project and process management competences to gather the right innovation team to process new ideas into added value and profit

Apply decision-making competences and an organisational network that ensure the ability to make quick decisions when ever needed

Communicative abilities to communicate strategy, possibilities, and priorities up- and downwards in the organisation

Creating the right balance between innovation and production tasks

Understanding of benefits from internal knowledge and network in the planning and development of organisational changes

The innovation management should include:

- Motivation of employees to generate new ideas and improvement suggestions
- Transform tacit knowledge and experience into explicit and spoken and shared knowledge
- Ensure that new knowledge are shared across the organisation, and the right knowledge reach the right people in the organisation
- Create organisational trust in engaging in innovative activities and in the innovation process model itself
- Encourage the employees to challenge the existing tool, methods, problem-solving processes, etc.
- Evaluation of, when the amount of ideas or the right ideas are present and the process should move on.
- Ensure that the innovation process are continuously running by removing obstacles, and ensuring that the right decisions are made at the right time between the main processes
- Ensuring the overall management support in the innovation process

Potential pitfalls

When designing an incentive structure for motivating employees to engage in innovative activities, the use of financial mechanisms should be well-thought, since money can be counter-productive in relation to innovation.

When implementing new initiatives in an organisation, the risk of changing elements that would create a resistance against change is prevailing

The use of external resources should be timed intelligent, and could be reduced to a facilitating or specialist role; the process responsibility should be anchored in the organisation at a managerial level.

If the desired innovation approach is radical, the organisational changes needs to be radical

Exploiting the tacit knowledge in an organisation is especially challenging in the preliminary phases, and requires a considerable effort from the management to succeed.

The upper management should prioritise handling risks and forming the premise, instead of taking decisions at the operational level.

The most frequent setbacks of the innovation process are caused by overruns of the initial plans and budgets; but the setbacks are often encountered in the latter part of the innovation process, when the setbacks materialises in failures

Promoters and employees involved in innovation often have difficulties in discriminating substantial critique from trivial comments, they are often blinded by their commitment to, and the potential of, the idea and the innovation, hence they do not see problems coming, and instead push the process forward.

Not all employees have a desire to participate in innovative activities, hence the management must accept this fact, and focus on stimulating and motivation those, who will contribute. In this perspective, the management should be aware of possible tensions between employees participating in innovation, and those who do not.

