

Reaching at Sustainable Development: Lean in the Public Sector

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Abstract

The concept of sustainable development is commonly used worldwide. In the public sector, characterized by a rationalization focus, conclusions about the sustainability of lean production (lean), as a management concept for organizational change, are contradictory. This thesis aims to identify conditions promoting sustainable development in the public sector, in particular the healthcare sector, when implementing lean.

Two qualitative and one quantitative case study were conducted using longitudinal data collection: focus group interviews, semi-structured interviews, analysis seminars, steering board meetings, and a questionnaire. The empirical data was collected from national lean programs in Sweden.

The results describe that socio-technical principles may be used as indicators of sustainability as well as a guide in the implementation of lean in healthcare. Active ownership among stakeholders, a developmental view in the organization, stakeholder participation, organized joint innovative learning activities, role and goal clarity may be conditions influencing the sustainability of lean in the public sector. Furthermore, when supported by a favorable lean context, the results show that the lean tools value stream mapping, standardized work and 5S (housekeeping) may promote a sustainable implementation of lean in healthcare by the promotion of employees and managers' working conditions and/or employee individual innovation. Visual follow-up boards may inhibit employees and managers' job satisfaction, when not supported by job resources. Personnel stability, time for development, and information to be able to participate were in this context shown to be central job resources.

In conclusion, conditions which may promote sustainable development in the public sector, when implementing lean are: stakeholder values of inclusive social well-being, an implementation process including stakeholder ownership and joint innovative learning, and a favorable lean context: balancing job resources and job demands. Lean tools may empower public healthcare employees to engage in development and counteract a poor implementation process and a poor lean context but only to a limited degree. The lean contexts studied were unfavorable, i.e., a weak implementation process and job resources not balancing the job demands. Hence, the lean implementations studied could not be considered sustainable.

Key words: Healthcare, participation, ownership, learning, clarity.

Sammanfattning

Hållbar utveckling är ett vanligt förekommande internationellt begrepp. Lean produktion (lean) är ett styrmedel för organisationsutveckling, som används i den rationaliseringsansatta offentliga sektorn. Dock är slutsatser kring hållbarheten i lean motsägelsefulla. Denna avhandling syftar till att identifiera faktorer som främjar hållbar utveckling inom offentlig sektor vid implementering av lean, med särskilt fokus på sjukvården. Två kvalitativa och en kvantitativ fallstudie utfördes med hjälp av longitudinell data-insamling: fokusgrupps- och semistrukturerade intervjuer, analysseminarium, styrgruppsmöten och en enkätstudie. Empirin samlades in i nationella lean-program i Sverige. Resultaten beskriver att socio-tekniska principer kan användas som indikatorer för hållbarhet samt som riktlinjer vid implementering av lean inom svensk sjukvård. Aktivt ägarskap bland intressenter, en utvecklingsinriktad arbetsorganisation, delaktighet, organiserade tillfällen för gemensamt innovativt lärande, roll- och måltydlighet kan vara faktorer som påverkar hållbart lean i offentlig sektor. Under förutsättning att kontexten är stödjande, så visar resultaten att lean-verktygen värdeflödesanalys, standardiserat arbete och 5S (ordning och reda) kan främja en hållbar implementering av lean inom sjukvården, genom ett främjande av anställdas inklusive chefers arbetsmiljö och/eller genom ett främjande av anställdas individuella innovationer i arbetet. Visuella uppföljningstavlor kan vidare försämra anställdas inklusive chefers arbetstillfredsställelse om lean-kontexten inte underbyggs med resurser i arbetet. Anställningstrygghet, tid för utvecklingsarbete och att få information, så att kunna delta i implementeringen, visades i det här sammanhanget kunna vara centrala resurser. Slutsatser från avhandlingen är att följande faktorer kan främja hållbar utveckling när lean implementeras i offentlig sektor: intressenternas värderingar kring inkluderande och socialt välmående, en implementeringsprocess som karaktäriseras av intressenternas ägarskap och gemensamma innovativa lärande samt en lean-kontext som karaktäriseras av en balans mellan resurser och krav i arbetet. Vidare så kan lean-verktyg stärka anställda inom offentlig sektor så att engagera sig i utvecklingsarbete och som en motkraft till en svag implementeringsprocess och en svag lean-kontext, men bara i en begränsad utsträckning. Studierna i avhandlingen pekar på en ogynnsam lean-kontext, d.v.s. en svag implementeringsprocess och att krav inte balanserades mot resurser i arbetet. Följaktligen så kunde inte implementeringarna av lean anses vara hållbara.

Nyckelord: Sjukvård, delaktighet, ägarskap, lärande, tydlighet.

Preface

This research has been made in collaboration between KTH, Royal Institute of Technology, Unit of Ergonomics, and HELIX VINN Excellence Centre, which is a VINN Excellence Centre at Linköping University working with questions relating to working life. The research group of the public lean program consisted of two professors (Jörgen Eklund and Lennart Svensson), one project leader (associate professor: Henrik Kock), and three PhD students (Pernilla Lindskog, Agneta Halvarsson Lundkvist, and Mikael Brännmark), whom all were affiliated to HELIX. The research project was supported by AFA Insurance under Grant 100013. The aforementioned researchers, except for the author of this thesis, were also involved in the research of the industry lean program.

Mikael Brännmark is unfortunately no longer with us. Mikael contributed to the study design, data collection, and initial analysis in the research project of the public lean program. Most importantly, Mikael was an excellent researcher and a person who knew the true meaning of inclusive social well-being. Mikael has been an inspiration throughout the whole research project and will also be so in my forthcoming projects.

Stockholm, September 2016

Pernilla Lindskog

List of Papers

This dissertation includes an extended summary of the following five papers, which are also appended in full. The papers will be referred to in the text by the following Roman numerals as follows:

Paper	Title	Author Contribution
I	Lindskog, P., Vänje, A., Törnkvist, Å., & Eklund, J. (2016). Sustainable Lean in psychiatry? Assessment through socio-technical principles. <i>International Journal of Quality and Service Sciences</i> , 8(1), 53-71.	Lindskog, P. had the overall responsibility for the process of writing the paper, from initial design to final paper. She also acted as an interactive researcher in the study: interacted with the practitioners, collected and analyzed empirical data, and continuously gave information to the practitioners about preliminary research results. Vänje, A. gave feedback on paper drafts and supported the initial writing process (before submission of the paper). She also discussed and contributed to the writing of the Nordic work model and the social system perspective in the first drafts of the paper. Törnkvist, Å. discussed and jointly planned the design of the research study together with Lindskog, P., provided complementary information in the case study when needed, and gave feedback on paper drafts. Eklund, J. discussed and gave feedback on the planning of the interactive research approach, empirical data collection methods, analysis of the empirical data, and paper drafts, throughout the study.
II	Lundkvist, A.H, Lindskog, P, Ståhl, J., Andersson, K., Melin, M., Barth, H., Svensson, L., & Eklund, J. (2016). Conditions Enabling Development in National Lean Programmes (submitted 2016-08-08).	<p>This paper includes empirical data and analyses from three national lean programs: the industry program (IP), the public program (PP), and the agricultural program (AP). Halvarsson Lundkvist, A. (AH), Svensson, L. (LS) and Eklund, J. (JE) conducted interactive researcher in the IP and in the PP. Lindskog, P. (PL) conducted interactive research in the PP together with the aforementioned authors. Ståhl, J. (JS), Andersson, K. (KA), Melin, M. (MM), and Barth, H. (HB) conducted interactive research in the AP. The researchers in each program collected and analyzed empirical data in the individual programs. All eight authors jointly analyzed the aggregated data presented in the paper. The aggregated data analysis was led by AH under the supervision of LS and JE. LS and JE also supervised the choice of empirical data, methods and analysis for the IP and PP.</p> <p>AH had the main responsibility of writing the paper, from initial drafts to final paper. Her supervisors (not authors) supported the writing process. PL co-wrote the paper: focusing on the conceptual idea of the paper, the literature review depicting support for employee participation and the findings in the public program. She also discussed and co-wrote parts of the methods and discussion sections, reviewed and commented the whole paper on several occasions. JS, KA, MM and HB co-wrote the paper: focusing on the findings and discussion sections regarding the AP. LS and JE reviewed and made improvements throughout the writing of the paper.</p>

III	Eklund, J., Lundkvist, A. H., & Lindskog, P. (2015). Lean implementation, work environment and sustainability. In Elg, M., Ellström, P-E., Klofsten, M., & Tillmar, M. (eds.), <i>Sustainable Development in Organizations: Studies on Innovative Practices</i> , 1 st edn. Edwar Elgar Publishing Limited, Cheltenham UK, pp 29-41.	Eklund, J. had the main responsibility of writing the paper, from initial drafts to final paper. Halvarsson Lundkvist, A. wrote research reports that made the basis for the empirical findings in the paper, took part in the analysis, and suggested changes in the final draft. Halvarsson Lundkvist, A. had the main responsibility as an interactive researcher in the industry and public program, collected and analyzed empirical data in both these programs. Lindskog, P. wrote research reports that made the basis for the empirical findings in the paper, took part in the analysis, and suggested changes in the final draft. Lindskog, P. was an interactive researcher, collected and analyzed empirical data in the public program, all together with Halvarsson Lundkvist, A.
IV	Lindskog, P., Hemphälä, J., Eklund, J., & Eriksson, A. (2016). Lean in Healthcare: Engagement in Development, Job Satisfaction or Exhaustion? <i>Journal of Hospital Administration</i> , 5(5).	Lindskog, P. had the overall responsibility for the process of writing the paper, from the initial design to final paper. She acted as an interactive researcher in the public program, collected and analyzed the empirical data. Hemphälä, J. supervised and co-wrote the paper, through the whole writing process, particularly focusing on the empirical data and analysis. Eklund, J. supervised and co-wrote the paper, through the whole writing process. He also discussed and supervised the choice of empirical data collection methods, and the design of the questionnaire. Eriksson, A. supervised and co-wrote the paper, through the whole writing process, particularly focusing on the theoretical framing of the article and the outline of the analysis model. She also discussed and supervised the analyses of the empirical data.
V	Lindskog, P., Hemphälä, J., & Eriksson, A. (2016). Lean Tools Promoting Individual Innovation in Healthcare (submitted to <i>Creativity and Innovation Management</i> 2015-10-16 and is now under a third review).	Lindskog, P. had the overall responsibility for the process of writing the paper, from initial design to final paper. She acted as an interactive researcher in the public program, collected and analyzed the empirical data. Hemphälä, J. supervised and co-wrote the paper, through the whole writing process, particularly focusing on the empirical data and analysis. Eriksson, A. supervised and co-wrote the paper, through the whole writing process, particularly focusing on the theoretical framing of the article and the outline of the analysis model. She also supervised and discussed the analyses of the empirical data.

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1. Introduction

The concept of sustainable development (Brundtland Commission, 1987; Matson et al., 2016; OECD, 2001; UN, 1992) is now commonly used worldwide. Corporations brand themselves as sustainable, state and local governments set sustainability targets, universities compete for sustainability awards, consumers show sustainability concerns, and citizens strive to reduce their environmental impact in concern for their children and grandchildren (Matson et al., 2016, p. 1). Even so, the research area of sustainable development is still relatively new why a definition of sustainable development, which is analytically and practically useful, is still evolving (Brundtland Commission, 1987; Lehtonen, 2004; Littig & Grießler, 2005; Matson et al., 2016). On a macro level, sustainable development is generally looked upon as a convergence between three dimensions or ‘pillars’; the environmental (ecological), economic, and social dimensions (Brundtland Commission, 1987; Lehtonen, 2004; OECD, 2001; UN, 1992). When analyzing sustainability in developed nations, some researchers mean that sustainable development, is closely related to social sustainability (Becker et al., 1999) and the organizing of work (Littig & Grießler, 2005). This reasoning is also close to the author’s understanding of sustainable development, where stakeholders’ needs in the organizations (i.e., that of the employer, employees and customers) must be balanced. As such, in sustainable development, organizations dynamically strive for inclusive social well-being: social since it means more than just the sum of individuals’ well-being (cf. all humanity), and inclusive concerning equity within and between generations (Matson et al., 2016, p. 15).

In the healthcare sector, the last couple of decades rationalization focus (Dahlgard et al., 2011; Elg et al., 2011; McKee & Healy, 2002a; Mohrman et al., 2012) has meant an implementation of management concepts promoting efficiency and effectiveness, as strategies for organizational development (Blomqvist, 2007; Hansell, 2005; McKee & Healy, 2002a). Lean production (Liker, 2004; Womack et al., 1990) is such an organizational development strategy which many healthcare organizations, including Swedish healthcare organizations, have implemented (D’Andreamatteo et al., 2015; Dellve et al., 2015; Högfelt et al., 2011). From a sustainability perspective, efforts to change and develop organizations have long been shown to be difficult (Bateman, 2005; Beer & Nohria, 2000). Identified outcomes from lean implementation appear to be positive impacts on working conditions (Dellve

et al., 2015; Drotz & Poksinska, 2014; Ulhassan et al., 2014) and productivity at work (De Treville & Antonakis, 2006; Niemeijer et al., 2013; Womack & Miller, 2005). However, lean implementation has also been put under criticism, mostly concerning working conditions (i.e., work intensification, increased management control, and the negative impact on employee health) (Delbridge, 2005; Landsbergis et al., 1999; Westgaard & Winkel, 2011). Hence, outcomes from lean implementation are likely multifaceted, i.e., lean has both positive and negative effects on organizations during implementation (Cullinane et al., 2014), depending on the lean implementation process and the context in which lean is implemented (Hasle et al., 2012; Ulhassan et al., 2014).

The ambiguity regarding lean; and the fact that only a few organizations have seemingly achieved the expected result following implementation (Bhasin & Burcher, 2006; Emiliani & Stec, 2005; Koenigsaecker, 2005; McCann et al., 2015), calls for more research, especially longitudinal studies, on lean in the public sector, in particular healthcare, and lean's sustainability (D'Andreamatteo et al., 2015; Fagerlind Ståhl & Ekberg, 2016). In general, it has been outlined that studies of process redesign in healthcare include unsatisfactory methodologies: available results are claimed to be inconclusive and contradictory (D'Andreamatteo et al., 2015; Ulhassan et al., 2014). Hence, this doctoral thesis will try to make a contribution in filling the knowledge gap in the research field of sustainable development focusing on conditions promoting sustainable implementations of lean in the public sector.

2. Literature Overview and Theoretical Background

2.1. Defining Sustainable Development

In contemporary societies, globalization, an aging population, an increase in global surface temperature, and increasing social inequalities (Brundtland Commission, 1987), have resulted in an increased awareness about sustainable development: in 1987, the United Nations World Commission on Environment and Development (WCED) manifested that societies need to strive towards sustainable development. Societies are subjected to constant or continuous development both from within, by citizens, and by external factors: technological advancements, policy changes or, in the most extreme form, World Wars (I and II) (Blomqvist, 2007; Piketty & Goldhammer, 2014), to mention a few. But, to understand what drives development the economic dimension is fundamental; in 1999, Dr. Gro Harlem Brundtland introduced the final World Health Assembly of the century by stating:

“I have always believed that you cannot make real changes in society unless the economic dimension of the issue is fully understood” (WHO, 1999, p. viii)

An example of how the economic dimension has affected societal development is the industrial revolution in Europe, starting at the beginning of the 19th century, where this revolution resulted in a societal development from agriculture capital to industrial capital (Piketty & Goldhammer, 2014, p. 116). Furthermore, in the aftermath of World War II the American economy prospered, also known as the postwar economic boom (Gordon, 2012; Maier, 1977; Marglin & Schor, 1990). This economic boom enabled the car manufacturing company Ford in becoming a dominating company on the world car market: Ford invested in larger and faster machines, built up their stocks in order to meet the demands of prosperous citizens demanding a diversity of car models. Inspired by Ford but much more limited in economic resources, the Japanese car manufacturing company Toyota managed to meet the competition from Ford; having long throughput times and high stock levels, by a series of simple process innovations, resulting in continuity in process flow. By these small-step innovations, Toyota could consequently offer a high variety of car models without large stock holdings as Ford did. This new manufacturing system was called the Toyota Production System and was later known as Lean Production (Krafcik, 1988; Liker, 2004; Womack et al., 1990) when spread globally (Brando de Souza, 2009; D’Andreamatteo et al., 2015).

Socially, another post-War effect was a decrease in income inequality where income from labor, as opposed to income from capital, increased resulting in an evening out effect between social classes in societies of developed countries (Piketty & Goldhammer, 2014, p. 274). Improvements in food intake and sanitation among citizens resulted in a dramatic decline in mortality (WHO, 1999) which also contributed to an economic progression, since healthy citizens live longer and are more productive (www.who.int/hdp/en, 2016-05-07).

Hence, social and economic development was spurred by the industrial revolution and post-War effects. However, in the last couple of decades, weariness about the effects on the environment has been raised, since the global surface temperature is gradually increasing, starting at the approximate time of the industrial revolution (National Centres for Environmental Information, www.ncdc.noaa.gov/monitoring-references/faq/anomalies.php). As a consequence, but also since social inequality is again increasing, focus on sustainability issues has been raised: in 1987, the Brundtland Commission agreed that:

“Sustainable development is development that meets the needs of the present without comprising the ability of future generations to meet their own needs” (Brundtland Commission, 1987, p. 41)

Again in 1992, the UN met to agree upon that sustainable development calls for a convergence between three dimensions of sustainability, namely, the environmental (ecological), economic, and social dimensions (Lehtonen, 2004; OECD, 2001; UN, 1992).

The Brundtland definition of sustainable development has received criticism (McKenzie, 2004) due to its rather broad inclusiveness (whose needs are to be met? What needs are to be met?), which makes it difficult to evaluate sustainability. However, the most agreed upon definition is that sustainable development includes the dimensions of ecological, economic, and social sustainability (Lehtonen, 2004; OECD, 2001; UN, 1992). These three dimensions of sustainability are closely related (Becker & Jahn, 1999, p. 4) where social sustainability is claimed to be the most central of the three (Becker & Jahn, 1999; Docherty et al., 2009b); since social, political and cultural principles of a society, and consequently also economic principles, guide the management and distribution of environmental resources:

“Achieving progress toward sustainability thus implies maintaining and preferably improving, both human and ecosystem well-being, not one at the expense of the other. The idea expresses the interdependence between people and the surrounding world” (Hodge & Hardi, 1997)

The social dimension is however far more difficult to quantify than economic growth or environmental impact (Dempsey et al., 2011; McKenzie, 2004; Vallance et al., 2011; Vifell & Soneryd, 2012) due to social sustainability relating to human well-being, which perception varies among citizens. Hence, there is no commonly accepted definition of social sustainability and no framework available for practical (Lehtonen, 2004) nor theoretical analysis of sustainable development (Littig & Grießler, 2005). However, from the perspective that social sustainability is the quality of societies, and modern societies are working societies; social sustainability is claimed to be mediated by work (paid and unpaid labor) (Littig & Grießler, 2005). Consequently, one important starting point in sustainable development ought to be the reorganization, or change, of work in our society (Littig & Grießler, 2005). Also, recently, Matson et al. (2016, p. 15) made an effort in clarifying the definition of sustainable development by stating that sustainable development is about people's inclusive social well-being, social in the sense of meaning more than just the sum of individuals' well-being, and inclusive concerning equity within and between generations. According to Matson et al. (2016, p. 15) important constituents of human well-being are material needs, health, education, opportunity, community, and security, which all directly or indirectly depend on environmental resources. Hence, a framework evaluating sustainable development ought to be embedded in the prevailing context involving stakeholders and potential users (Becker & Jahn, 1999; Lehtonen, 2004), focusing on inclusive social well-being (Matson et al., 2016, p. 15). Furthermore, sustainability is claimed not to be static but may be seen as the dynamic state of becoming, being, and staying sustainable, where sustainable development can be referred to the purposeful efforts supporting this dynamic condition of sustainability (Docherty et al., 2009c, p. 8).

Accordingly, this doctoral thesis focuses on sustainable development from the perspective of organizational development or the reorganization of work. *Sustainable development* will hence hereafter be used in indicating organizations' purposeful dynamic efforts in functioning in its environment¹ and achieving its economic or operational goals by optimizing organizational performance and good working conditions (Brännmark & Benn, 2012; Docherty et al., 2009c, p. 3; Elg et al., 2015), where these dynamic efforts are

¹ In this doctoral thesis, focus is foremost put on the social and economic dimensions of sustainable development.

guided by values of inclusive social well-being (Matson et al., 2016, p.15)(cf. Murphy (2012), Lehtonen (2004), and Littig and Griessler (2005)).

2.2. Organizational Development towards Lean

Historically, the dynamic state between stakeholders' needs in conjunction to organizations may be illustrated by a pendulum movement, swinging between the needs of the employer, the employees, and the customer (Eklund, 1998), in an effort to reach equilibrium:

The Scientific Management, or Taylorism, introduced in the era of the industrialism, at the beginning of the 19th century, had a major focus on productivity; guided by the values (1) there is only one correct routine for the job, and (2) there is one proper person for each task (Taylor, 1911). However, the Scientific Management philosophy received a lot of criticism due to inhuman employee working conditions: monotonous work with few opportunities to participate in developing the work processes (Pruijt, 2003), cf. the Ford assembly line. The growing dissatisfaction around the working conditions paved way for anti-Tayloristic movements, e.g., the movement of Human Relations (Mayo, 1945). In Human Relations focus was rather put on how to promote motivation and engagement among the employees; knowledge had also been raised about productivity decreasing in bad working conditions, including social and organizational aspects (Brown, 1955; Sandkull & Johansson, 1996). As a consequence of the Human Relations movement, a socio-technical management strategy paved way in Sweden, as well as in other Nordic countries (Edvardsson & Gustafsson, 1999), promoting values such as work place democracy, equity, and autonomy (Börnfeldt, 2006; Oudhuis & Olsson, 2011; Trist & Bamforth, 1951; Vänje & Brännmark, 2015). In practice, this meant a focus on both the social system², in promoting an engaged workforce, and the technical (or economic) system, in managing processes effectively (Shah & Ward, 2007).

In the beginning of the 1970's, as a consequence of globalization and consequently profound competition from nations having low-cost production, higher demands on efficient and effective production were seen; shorter lead times, high quality, and low cost production (Sandkull & Johansson, 1996). This global competition paved way for the Total Quality Management (TQM) era (Deming, 1986) focusing on not only productivity

² A social system perspective means that employees need 1) a purpose with the work task and variation, 2) to be able to learn, 3) to be able to make decisions within a specified area, 4) to get respect and understanding, 5) to see the working context in relation to the outside world, and 6) to see how the work is connected to individual future plans (Thorsrud, E. and Emery, F., 1969).

but also on how to better meet the customers' demands of high quality products and services, where employees' participation in continuous improvements of the organization and the production processes was considered as key aspects (Axelsson & Bergman, 1999; Börnfelt, 2006). The prosperous Japanese car manufacturing company Toyota, having been inspired by TQM (Pruijt, 2003), attracted other nations' interests in the Toyota Production System (TPS) (Sandkull & Johansson, 1996). When TPS spread to the United States of America it later evolved to the management philosophy called Lean Production (hereafter called lean) (Krafcik, 1988; Liker, 2004; Womack et al., 1990).

Further on, lean spread to other sectors including healthcare (D'Andreanmatteo et al., 2015). In developed countries, the generic response to cost savings³ in public healthcare was to reduce hospital stays and to improve the efficiency of the system, inspired by the productivity focus seen in the industry sector. Around 1990, but already introduced in the mid-1980's, strategies to improve public sector efficiency were implemented in Sweden, and elsewhere, through the introduction of the New Public Management (NPM) (Healy & McKee, 2002b; Hood, 1991; Hood, 1995). The NPM was, according to Hood (1991), the most extensive international trend in the last 15-years of public administration and opened up for management concepts originating from the private sector. In 2001, lean was first introduced in healthcare, approximately ten years later than in industrial mass production, and has thereafter spread internationally as a concept for organizational change in healthcare (Brando de Souza, 2009; D'Andreanmatteo et al., 2015).

2.2.1. Lean

Originally, when implementing lean (Liker, 2004; Womack et al., 1990), the production line has no buffers but is rather pulled by the demands from customers where the production process is continuously improved by the employees in eliminating non-value-adding activities (Liker, 2004). This is why the term lean has connotations to 'thin' or 'meager', as in 'meager production'. However, lean continuously evolves since it is translated into the organization in which it is implemented (Langstrand, 2012): lean in the

³ In the public sector of Sweden, as well as in United Kingdom, money spent on the public system increased as a consequence of the post-world war II economic development (Piketty, T. and Goldhammer, A., 2014) but this development came to a turn around the economic recession in the 1970's (SKL 2005a). The economic recession in combination with post-war demographic changes and medical technology advancements turned the political focus to public sector savings instead (Berlin, J. and Kastberg, G. 2011).

US or in Great Britain is considered being influenced by the Tayloristic tradition, i.e., being characterized by the traditional philosophy of control (Berggren et al., 1991; Oliver & Wilkinson, 1988). In Scandinavian countries, the implementations of lean rather tend to be influenced by socio-technical principles, i.e., democracy, equity, and autonomy (Bohgard et al., 2008; Börnfelt, 2006; Oudhuis & Olsson, 2011; Sandberg, 1982; Sandkull & Johansson, 1996; Schiller, 1994; Sederblad et al., 2013; Trist & Bamforth, 1951; Vänje & Brännmark, 2015). Hence, lean is context dependent and consequently difficult to define (Dahlgaard et al., 2011; Langstrand, 2012). However, a common overall understanding is that lean is an integrated socio-technical work system (Shah & Ward, 2007) whose main objective is to eliminate waste, i.e., reduce non-value-adding activities, and maximize customer benefits in organizations and their processes (Liker, 2004; Womack & Jones, 2003; Womack et al., 1990). Lean includes philosophical aspects such as values and principles, with an emphasis on the underlying principle of continuous improvement (CI) and respect for people (Liker, 2004; Sugimori et al., 1977). CI encourages change and creative thinking in the organization of work (Prajogo & Sohal, 2001), closely associated with innovation (Aoun & Hasnan, 2013; May, 2007; McAdam et al., 1998). In healthcare, lean is commonly defined as process improvement work (Poksinska, 2010; Radnor et al., 2012). Hence, lean tools are experimented upon (Dellve et al., 2015; Mazzocato et al., 2010), by healthcare professionals and managers, to improve financial incentives, including efficiency, clinical outcomes, satisfaction, and safety for both employees and patients (D'Andreamatteo et al., 2015). Commonly applied tools are visual follow-up boards, standardized work, 5S (housekeeping), and value stream mapping (VSM) (Pettersen, 2009).

Visual follow-up boards is a lean tool which purpose is to render more visible, clear and understandable information, to facilitate employee participation in continuous improvement activities, and to increase employees' capacity for decision-making in the organization (Jaca et al., 2014). Also, visual follow-up boards are claimed to promote the generation of creative ideas and to foster innovation (Bititci et al., 2015). The creation of new ideas is claimed to occur unofficially behind the scenes, in what is known as implicit work processes as opposed to explicit processes which are officially prescribed work processes (Ellström, 2010). The interplay between the explicit and implicit work dimensions, or what is also known as developmental (ibid.) or innovative learning (Nonaka & Takeuchi, 1995), is claimed to be the driving force for innovation. Hence, creativity in everyday

work ought to be put on display, which may be supported by the use of visual follow-up boards. Visual follow-up boards may also be used as a support in on-going strategy and facilitate follow-ups of performance measurements (Bititci et al., 2015).

Standardized work is one of the key components of lean tools (Olivella et al., 2008). The standardized work aims to achieve a clear, accepted, and most efficient way of working, which is thought to provide a standard from which improvements will result (Liker & Meier, 2006). Standardization and creativity could be claimed to be opposites based upon the variation reduction of the former and the variation enhancement of the latter (De Treville & Antonakis, 2006). However, theoretical and empirical research has found that these two can be mutually supportive since ideas also can be generated from a common standardized work (Eklund et al., 1998; Gilson et al., 2005).

Housekeeping or *5S* is also considered a form of visual monitoring and standardization (Fagerlind Ståhl, 2015), which purpose is to organize the workplace in order to efficiently carry out daily tasks in a safe manner. For example, working aids should be stored in kept areas when not in use. As with standardized work, *5S* is believed to foster adaptive creativity (Ekvall, 1997); it may also free up time used to remedy disruptions in the work process and invest that time in further improvements instead (Fagerlind Ståhl, 2015).

Value stream mapping (VSM) (Henrique et al., 2016) is a lean tool where employees map or chart the operations, analyze the value flow, and identify actions needed in order to remove non-value adding activities and make work flow more smoothly (i.e., shortening the process lead time). In this way, the work process becomes clear and the roles and actions of individuals can be understood in a larger organizational context. Thus, VSM may be deemed to promote clarity in the organization, encouraging employee participation and involvement in problem solving, and facilitating an innovative learning climate (Fagerlind Ståhl, 2015; Fagerlind Ståhl et al., 2015).

Hence, through the use of different lean tools, employees may be engaged in small-step innovation of work processes, i.e., incremental process innovations (Weick & Quinn, 1999). When working with process innovations in healthcare, there are several complex challenges to meet (Edwards & Nielsen, 2011); since structural inflexibility of hospitals usually make them resistant to change, both structurally and culturally (McKee & Healy,

2002b). Hence, in complex systems as healthcare organizations there is a risk that creative ideas from employees are not acknowledged (Ekvall, 1997). According to Radnor and Walley (2008), even if improvements do arise in healthcare, they tend to be focused upon short-term outcomes rather than longer-term developments, indicating adaptive creativity (Ekvall, 1997). Some researchers even imply that lean, and the use of lean tools, may have a negative impact upon the innovation capability (Chen & Taylor, 2009). Others hypothesize a decrease in innovation effects due to lean tools not enabling the delegation of decision-making responsibilities to employees (Arundel et al., 2007).

In regard of employee working conditions, lean implementation has been related to increased job demands and decreased resources (Landsbergis et al., 1999). A number of studies have placed emphasis upon work intensification, increased management control, a negative impact upon employee health from implementing lean (Delbridge, 2005; Landsbergis et al., 1999; Westgaard & Winkel, 2011). However, others suggest more positive aspects such as employees tend to display higher work motivation and to be more productive in lean implementation than do workers in other settings (De Treville & Antonakis, 2006). Recent research shows that a high degree of application of lean tools on operative levels in hospitals, in the short-term, positively impacts the working conditions of healthcare professionals (Dellve et al., 2015).

Likely, lean may have both positive and negative effects on organizations during implementation of lean (Cullinane et al., 2014), depending on the implementation process and the context in which lean is implemented (Hasle et al., 2012; Ulhassan et al., 2014). For example, in a study by Ulhassan et al. (2014), a successful implementation process was positively related to improved psychosocial work conditions, while an unsuccessful implementation process seemed to have adverse effects. Furthermore, increased psychosocial work resources and decreased work demands were, in another study, shown to be crucial for healthcare professionals' increased engagement in lean (Dellve et al., 2016). Even so, there is a deficiency of previous knowledge about conditions affecting sustainable implementations of lean in healthcare (D'Andreamatteo et al., 2015).

2.3. Conditions for Sustainable Development

The NPM was effective in healthcare in that both average length of stay and number of beds in hospitals per 1000 population were consistently reduced. This reduction was particularly notable for inpatient hospitals in Scandinavia (Hensher et al., 1999). However, occupancy rates remained fairly static, indicating large increases in the throughput of hospitals; more patients pass through hospital beds in shorter periods of time (Healy & McKee, 2002a; Hensher et al., 1999). As compared to other sectors in Sweden, sick leave among people working in the public healthcare sector has become more prevalent (AV, 2016; Eklund, 2003; Försäkringskassan, 2014), indicating strenuous employee working conditions in healthcare. In countries such as the United Kingdom and the United States, reductions in staff and facilities have not been matched by reductions in workload where the increased pressure on the employees have led to a decline in the quality of care and worker productivity (Hensher et al., 1999; Reissman et al., 1999). These changes seen in hospitals have also caused reactions among the public: in an international public opinion poll, including Australia, Canada, New Zealand, the United Kingdom, and the United States, fewer than one in four respondents reported that the healthcare system works well (Aiken & Sloan, 2002; Donelan et al., 1999). Still, hospital costs have long been one of the largest components of health expenditures in most of the countries in the Organization for Economic Cooperation and Development (OECD) (Hensher et al., 1999). Public sector organizations often exceed the budgets (Mohrman et al., 2012) and rationalization strategies have characterized this sector for some time now (Federation of Swedish County Councils, 2002; Hansell, 2005; Morreim, 1990). Hence, decreased economical resources, social and demographic changes, high-paced technology development, and higher demands from citizens, are some of the reasons why a diversity of political and management strategies about how to run the public sector in the most efficient and effective manner have been introduced in public sector organizations (Bergin & Rønnestad, 2005; Blomqvist, 2007; McKee & Healy, 2002a). However, to change organizations have been shown to be difficult (Bateman, 2005; Beer & Nohria, 2000; Dahlgaard et al., 2011). Even so, greater attention to conditions for sustainable development, including working conditions and well-being, is claimed to benefit the pursuit of higher quality and more efficient healthcare through process redesign such as lean (D'Andreanmatteo et al., 2015).

In Nordic countries, values in working life are claimed to be influenced by socio-technical principles: organizational democracy, codetermination and

autonomy (Börnfelt, 2006; Oudhuis & Olsson, 2011; Sederblad et al., 2013; Vänje & Brännmark, 2015). According to Docherty et al. (2009c, p. 9), discussing conditions for sustainable work systems, activities in organizational development need to be value-based since values are claimed to be the cornerstones for building sustainability. Furthermore, in organizational development, such as in the implementation of lean, a feeling of a win-win situation is claimed to be needed between stakeholders associated to the development (Eklund, 1998). According to Eklund (1998), the most crucial stakeholders are the customer (e.g., the citizen or the patient), the employer, and the employees. If there is an imbalance between these stakeholders' interests, there is an imminent risk that the organizational development strategy will be unserviceable and hence not sustainable.

2.3.1. Stakeholder Participation and Ownership

Stakeholder participation, is claimed to be a critical sustainability condition (Börnfelt, 2006; Oudhuis & Olsson, 2011; Vänje & Brännmark, 2015) since people involved in decision-making are generally more engaged in sustainability reforms (Murphy, 2012). Hence, contemporary perspectives of sustainable development tend to advocate bringing together stakeholders and various actors, from the public sector, economic interests, community groups, and the scientific communities, at some stage in the policy-making process (Baker, 2009). Networks of social relations characterized by norms of trust and reciprocity, generally referred to as social capital (Putnam et al., 1992, p. 167; Stone & Hughes, 2002), are claimed to facilitate the coordination of actions and can thus improve efficiency in a society (Putnam et al., 1992, p. 167; Stone & Hughes, 2002). The way participation can be fulfilled ranges from information, with no decision-making mandate, to opportunities to influence, and participation in decision-making (Arnstein, 1969; Eklund, 2000; Knudsen et al., 2011; Wilson, 1991). The concept of participation has been put under some criticism (Klein, 1984) where claims have been raised that there are so called false to true attempts to implement participation (Arnstein, 1969; Wilson, 1991). However, there are several evidence pointing towards organizational benefits of stakeholder participation (Eklund, 2000; Strauss, 1998), for examples: employee engagement and ownership of changes made (Lawler III, 1986), creativity and innovation (Alasoini, 2012; Aoun & Hasnan, 2013), enhanced learning in the workplace (Inanc et al., 2015), and more effective and successful change initiatives (Aikens, 2011; Aoun & Hasnan, 2013; Arundel et al., 2007; Beer & Nohria, 2000; Docherty et al., 2002; Hammuda & Dulaimi, 1997).

Stakeholder participation needs to be supported (Wilson, 1991) and there is no straightforward guide in how to do this. Active stakeholder ownership, i.e., active interest in ongoing processes, readiness to make use of the results, support and allocation of resources for the development work, has however shown to be an important condition in organizational development (Benn et al., 2014; Brulin & Svensson, 2012).

2.3.2. Joint Innovative Learning

Organized learning activities with involved stakeholders, who jointly analyze challenges in the development of the organization, is an important condition for organizational development (Brulin & Svensson, 2012). By participating in development, stakeholders consequently are allowed to review the development work so as to be able to learn from mistakes (Cherns, 1976). In so doing, the organization creates the potential for double loop learning (Argyris, 1977), i.e., the modification of work processes in light of experiences made. Learning triggered by something that disturbs or questions the understanding of the current situation is described as innovative (Nonaka & Takeuchi, 1995) or developmental (Ellström, 2010). When such learning is triggered, the understanding of problems and possible solutions may generate opportunities for innovative re-combinations of knowledge (ibid.). If such innovative learning is made jointly among stakeholders; cf. a joint learning process (Aagaard Nielsen & Svensson, 2006; Svensson et al., 2015)), incorporated changes, or innovations, will more likely be implemented sustainably due to joint reflections and learning (Svensson et al., 2015). Joint innovative learning may also promote equity, which is another key sustainability concept, in which stakeholders have an equal opportunity to fulfill their developmental potential (Murphy, 2012) and individual capabilities (Lehtonen, 2004).

2.3.3. Well-being at Work

In general, the promotion of harmonious co-existence among stakeholders has been linked to well-being: quality of life (OECD, 2014), lower employee turnover, lower levels of sick leave, and more engaged employees (Spector, 1986), cf., inclusive social well-being (Matson et al., 2016, p. 15). Generally, well-being at work, or the regeneration of human and social resources (Docherty et al., 2009a), is dependent on the presence of adequate job resources balancing the job demands (Demerouti et al., 2001). Furthermore, job resources promoting health at work (Ekberg, 2006), are claimed to also promote organizational development, including creativity and innovation (Shalley & Gilson, 2004; Terziovski, 2010; Wernerfelt, 1984). When

identifying crucial job aspects for employee health, the Karasek's job demand-control model (JD-C model) (Karasek Jr, 1979; Karasek & Theorell, 1990) has been used. However, this model has been questioned for not being as valid in present work contexts (Hasle, 2014). For example, employees perceiving a reduced level of autonomy, or job control, may still be motivated and engaged at work if that perception is accompanied by other job-design factors that compensate for this lack (De Treville & Antonakis, 2006). The JD-C model was later expanded by a support dimension, i.e., the Job Demand-Control-Support model (JDC-S model) (Johnson & Hall, 1988; Johnson et al., 1989). However, in order to capture the complex character of organizational development (Niepce & Molleman, 1998; Shah & Ward, 2007), many have suggested an open and flexible analysis model (Cullinane et al., 2014; Dellve et al., 2016; Demerouti et al., 2001) – similar to the Job-Demands and Resources model or JD-R model (Demerouti et al., 2001) - which expands these earlier models of work-related stress and burnout.

Previous research has shown that both job demands and job resources can be related to job satisfaction, exhaustion, work engagement, and work performance (Bakker & Demerouti, 2007; Bakker et al., 2004; Demerouti et al., 2001; Lewig & Dollard, 2003), i.e., high levels of disengagement are predicted when job resources are low (Demerouti et al., 2001). Hence, the JD-R model is built upon the hypothesis that there is a positive correlation between job demands and exhaustion, and that adequate job resources correlate to employee engagement. Also, the JD-R model allows for various work conditions to be used; job resources and job demands can be adjusted to the specific occupational group under study, in explaining outcomes such as engagement, exhaustion, and job satisfaction in the specific context (Cullinane et al., 2014; Demerouti et al., 2001). As such, the JD-R model may well be a suitable model evaluating sustainable development from the perspective of inclusive social well-being (Matson et al., 2016, p. 15). Furthermore, the JD-R model was recently used in capturing the duality of lean and its consequent effects on engagement and worker health (Cullinane et al., 2014). Hence, in this doctoral thesis, analysis models have been inspired by the JD-R model and include a number of job resources: job security (i.e., psychological safety and personnel stability), development resources, job control, role clarity, and stakeholder participation.

Job Security

Job security (i.e., psychological safety and personnel stability) is regarded as an important resource since insecurity in rationalization processes, parallel to the lean implementation, has been shown to hinder lean implementation in the public sector (Rahbek Gjerdrum Pedersen & Huniche, 2011; Trägårdh & Lindberg, 2004; Waring & Bishop, 2010). Also, according to a number of empirical research studies, psychological safety positively influences innovation (Edmondson & Mogelof, 2006; Isaksen et al., 2001; Kostopoulos & Bozionelos, 2011), as in work process innovations in lean. In addition, psychological safety is claimed to be fundamental in mitigating negative perceptions associated with interpersonal risk-taking that is inherent in activities such as innovation (March, 1991), e.g., admitting errors, asking for help, or speaking up to present ideas (Edmondson, 2003).

Following the same argument, creativity and innovation are likely to decline during periods of downsizing or absence of personnel stability; employees that survive downsizing events also tend to become more narrow-minded and risk-averse (Cascio, 1993), traits that have an adverse effect upon creativity and innovation.

Development resources

Lack of time and opportunities for discussions with colleagues have been shown to inhibit nurses in becoming involved in development work (Hallin & Danielson, 2008). Hence, sufficient development resources are considered critical for successful healthcare implementation of development work (Ahgren & Axelsson, 2007). Furthermore, having time to think and explore new ideas is frequently mentioned as a factor that supports creativity (Amabile & Gryskiewicz, 1987; Gruber & Davis, 1988). The access to and combination of different development resources are also deemed to be vital for creativity and innovation in organizations (Shalley & Gilson, 2004; Terziowski, 2010).

Job control and Role clarity

At the Virginia Mason hospital, which is known for successful implementation of lean (Womack & Miller, 2005), roles and expectations are explicit, and managers seek to clarify expectations, responsibilities, and accountabilities. Claims have also been raised that if individuals have relatively high autonomy and job control, creativity will likely be fostered (Amabile et al., 1996). Additionally, individuals are likely to generate more

ideas if they perceive that they have a choice in how to go about accomplishing the tasks they are assigned (Axtell et al., 2000). Also, in a structured organization, such as healthcare, favoring role clarity is assumed to promote the adaptive creativity character of lean in healthcare (Ekvall, 1997). However, clear roles do not mean organizational asymmetries in power and knowledge since these tend to encourage a coercive formalization of work processes, which has negative effects on creativity and engagement as well as participation (Adler & Borys, 1996).

Stakeholder participation

An ideal implementation of lean requires the kind of organization that values stakeholder participation as a part of its culture (Eklund et al., 1998; Womack & Miller, 2005). Winkel et al. (2015) concluded that participatory approaches in value stream mapping enable the involvement of employees in hospitals. Also, emphasis has been placed upon the need for stakeholder participation in decision-making if one wishes to promote idea implementation (Axtell et al., 2000; Baer, 2012) and if reaching for a high-performance work organization (Aikens, 2011; Arundel et al., 2007).

Job demands

In order to promote engagement, job satisfaction, while not promoting employee exhaustion, the job demands must be balanced against the job resources (Demerouti et al., 2001). However, job demands can either be a challenge that promotes creativity or an excessive workload, thus inhibiting creativity (Amabile et al., 1996). For instance, time pressure can be associated with high creativity, except when that pressure reaches an undesirable level (Andrews & Farris, 1972). In this thesis, job demands are operationalized as an excessive workload.

To conclude the reasoning on well-being at work, even if research about conditions affecting well-being and innovation exists, there is a deficiency of research about conditions affecting sustainable implementations of lean in healthcare (D'Andreamatteo et al., 2015).

2.4. Research Objective

The objective of this doctoral thesis is to identify conditions promoting sustainable development in the public sector, in particular the healthcare sector, when implementing lean.

In more detail, the first (I) paper deals with identification of conditions affecting sustainability of lean implementations in Swedish psychiatric healthcare. Paper II identifies conditions enabling development in national lean programs including the public sector. The third (III) paper describes the impact on working conditions from the implementation of lean, and the sustainability of lean, for manufacturing industries and the public sector in Sweden. Paper IV identifies to what extent lean tools (visual follow-up boards, standardized work, 5S [housekeeping], and value stream mapping [VSM]) promote working conditions for employees and managers in healthcare organizations (outcomes: engagement in development, job satisfaction and exhaustion), while considering the context (i.e., job resources and job demands) and aspects of the implementation process. The fifth (V) and last paper identifies the influence of lean on employee individual innovation by considering contextual factors (i.e., the same job resources as in paper IV) and the lean practice (i.e., the same lean tools as in paper IV).

3. Method

3.1. Study Design

In order to be able to add knowledge to the research area of sustainable development in the public sector, the empirical data in this research has been collected within the research project *Verksamhetslyftet* (the Operations lift). The research project did research on the national lean program in the public sector of Sweden, hereafter called the public program, between 2010 and 2013. The purpose of the research project was to improve knowledge about working conditions and the sustainability of the changes implemented in public sector organizations. The research group consisted of two professors, one project leader (associate professor), and three PhD students (of whom the author of this thesis was one). The research project was supported by AFA Insurance under Grant 100013. A project reference group consisted of representatives from the Swedish Association of Local Authorities and Regions (Sveriges Kommuner och Landsting, SKL), the former Foundation for Employment Security Fund for the Local and Regional Government in Sweden (Trygghetsfonden), and unions active in the public sector in Sweden.

The study design in this research was inspired by triangulation; by both including qualitative (study A and B) and quantitative (study C) research methodologies. Qualitative research can be defined as the understanding of meaning; how people make sense of their world; how they understand and experience their context (Hignett & McDermott, 2015). As such, qualitative research has often an inductive approach in that theories are to be formulated out of the research results (Bryman, 2011). Quantitative research, on the other hand, has often a deductive approach in that theories are indirectly tested through the development of hypotheses, developed from existing theories, and a consequent testing of these hypotheses (ibid.).

Since the literature offers no consensus on how to define and evaluate sustainable development, this thesis builds on three studies (study A-C), having had an exploratory, interpretive, and explanatory approach, summarized in Table 1. Qualitative case studies, A and B (paper I-III), were used to explore conditions influencing sustainable development when implementing lean in the public sector, particularly in healthcare. A qualitative case study is defined as a holistic description and analysis of a unit or phenomenon (Merriam, 2006) and has the character of uncovering contextual conditions, where questions such as “how” and “why” can be

asked (Yin, 2003; Yin, 2014). The unit of analysis needs to be defined and limited to a case, e.g., to an individual, a unit, a hospital, or a county to mention a few (Merriam, 2006; Yin, 2003; Yin, 2014). However, a case can also be a program, an implementation process, or organizational change in general (Yin, 2003; Yin, 2014). The case of this thesis was 'sustainable development in the public sector' where study A had an exploratory and interpretive character (ibid.) in laying the groundwork of the forthcoming two studies (B and C). Hence, study A, including data from a single source, had both an inductive and deductive approach since conclusions from the first interview occasion were later hypothesized and tested in the second interview occasion in the study. Study B also had an exploratory and an interpretive character (ibid.), i.e., an inductive approach, in asking "how" and "why" about the lean context (paper II and III) and a deductive approach in structuring the findings in a theory model, cf. testing a theory, in paper II. Study B provided information about additional conditions influencing sustainable development in the public sector, and confirmed previous identified conditions, by including multiple sources, i.e., data triangulation.

In the quantitative study C (paper IV-V), conditions, identified in the qualitative studies (paper I-III), influencing sustainable development was examined and explained in relation to sustainable development. Explanatory research (Yin, 2003; Yin, 2014), or deductive research (Bryman, 2011), is suitable when enough knowledge about the case is gained and is defined as an attempt to connect ideas in understanding cause and effect.

Table 1. Overview of study A-C: type, level, focus, sample data collection method, analysis, and resulting papers

Study	Type	Level	Focus	Sample	Data Collection Method	Analysis	Resulting Paper
A	<u>Exploratory/Interpretive:</u> Qualitative Case Study (Single Data Source)	Individual and Organizational	<u>Working conditions:</u> Identify and describe conditions affecting managers when implementing lean in the public sector	First-line managers in a Swedish hospital psychiatry division	Longitudinal focus group interviews	Qualitative Content Analysis	Paper I
B	<u>Exploratory/Interpretive:</u> Qualitative Case Study (Multiple Data Sources)	Organizational and Institutional	<u>Working conditions and work process innovation:</u> Identify and describe conditions enabling sustainable development when implementing lean	National lean program management, national lean program coaches, managers/owners, and employees in Swedish industry, public, and agriculture sector	Interviews, analysis seminars, and steering board meetings	Qualitative Content Analysis	Paper II and III
C	<u>Explanatory:</u> Quantitative Case Study (Multiple Data Sources)	Individual and Organizational	<u>Working conditions and work process innovation:</u> Identify the influence of lean tools on working conditions and individual innovation by considering contextual factors and the lean implementation process	Managers and employees in the public healthcare sector of Sweden	Longitudinal Questionnaires	Quantitative Analysis Model (JD-R)	Paper IV and V

Furthermore, throughout the whole research project, an interactive research approach was applied with the purpose of validity and of incorporating a joint learning process between the researchers and the participants (Svensson et al., 2015). However, the degree of interactivity came to differ in the different studies (A-C) in the research project, see Table 2. The joint analysis seminars, steering board meetings, in paper II and III, as well as the focus group interviews, in paper I, were all characterized by a high level of interactivity. The quantitative study (C: paper IV and V) was interactive to some extent in giving feedback on preliminary results to contact persons in participating organizations.

Table 2. Study design in appended papers

Research Design and Empirical Data	Paper I	Paper II	Paper III	Paper IV	Paper V
Research Approach					
<i>Interactive</i>	✓	✓	✓	(✓)	(✓)
Study Design					
<i>Qualitative Case Study (Explorative/Interpretive)</i>	✓	✓	✓		
<i>Quantitative Case Study (Explanatory)</i>				✓	✓
<i>Longitudinal</i>	(✓)	(✓)	(✓)	✓	✓
Empirical Data					
<i>Focus Group Interviews</i>	✓				
<i>Interviews</i>		✓	✓	✓	✓
<i>Analysis Seminars</i>		✓	✓		
<i>Steering Board Meetings</i>		✓	✓		
<i>Questionnaire Study</i>				✓	✓

3.1.1. Interactive Research Approach

Academic research has more and more often been criticized for not corresponding to the fast changing society of present time. Claims have been raised that research needs to be closer to reality and practice and that the development of new knowledge will not gain from isolation but rather from networking, meetings, joint development processes and debates with practice (Ellström et al., 1999; Svensson et al., 2002). According to Svensson et al. (2002):

“Something is happening! The interest in research is growing fast in companies, institutions, organizations, and government. But, it is not the traditional research which is asked for but rather something new: an approach focusing on useful knowledge, a multidisciplinary and an interactive approach which allows for participation in the process of research.”
(*ibid.*: translated from Swedish)

Research approaches have hence been developed focusing more on a joint development process; e.g., action research and interactive research (Aagaard Nielsen & Svensson, 2006). Svensson et al. (2015) claim that the interactive research approach, as opposed to the action research approach, is focused on a joint learning process where both the researcher and the participants develop during the research process, see Figure 1.

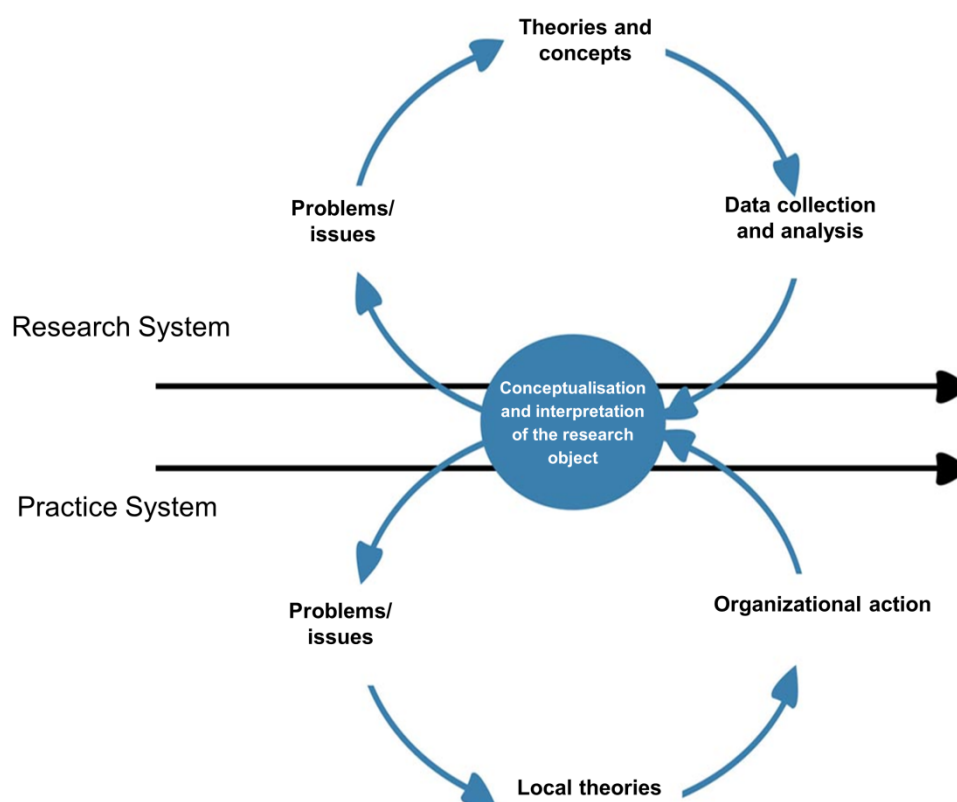


Figure 1. A model for interactive research (Ellström et al., 1999)

The participants have an important role in an interactive research approach by being part of the joint learning throughout the entire research process – from the definition of the problem to the analysis and dissemination of the results (Aagaard Nielsen & Svensson, 2006; Svensson et al., 2002). The research should be characterized by relationships among equals and a high degree of participation. The ambition to develop equitable and mutual relationships between and with the participants is also pronounced in Participatory Action Research (Whyte, 1991, p. 19), Co-generative Action Research (Greenwood & Levin, 2007, p. 94), and Action Science (Argyris et al., 1985, p.237, 268-269; Friedman & Rogers, 2008). All these research approaches can be called collaborative research (Ellström et al., 1999;

Svensson et al., 2015), as an umbrella concept (Haines et al., 2002). By including the participants in the whole research process the validity of the research results increases and the incorporated changes in practice is claimed to be more sustainable due to critical reflection and analysis in the joint learning process (Svensson et al., 2015). From the participants' point of view, reflections and interpretations are to be fed back into the organization, into their next cycle of problem-solving activities. By so doing, the participants learn about existing processes in their organization and how these processes affect their work. By such knowledge, it is more likely that they also contribute in participating in the work of continuously improving the work processes in the organization (Ellström, 2008).

In short, interactive research has a threefold purpose; to produce new scientific knowledge to academia (Science), to develop organizations through work process innovations (Practice), and to make both researchers and the organizations to learn (Ellström et al., 1999).

Philosophically, interactive research is based on both pragmatism and critical realism (Aagaard Nielsen & Svensson, 2006). In pragmatism, the meaning of an idea can only be understood when it is put in practice (Svensson et al., 2015). Further, practice is the starting point, but theory is needed to understand consequences of practice, to release experiences and possibly also to change previous experiences (ibid.).

Critical realism, cf. transcendental realism (Bhaskar, 1978), seeks to explain fundamental conditions of human action in terms of underlying mechanisms, patterns and structures. Rules, power and resources are here considered as setting important limits on action, but also as opportunities for change (Svensson et al., 2015). The task of critical realism research is to reveal mechanisms in society affecting the players, for instance, in terms of gender and class, irrespective of whether they are aware of them (ibid.). When having an interactive research approach one discusses how a balance between different interests can be achieved, e.g., between the individual, the organization and society; between employees and the employers; or between men and women (ibid.).

3.2. Research Context

The purpose of the public program was to support the implementation of lean in the municipalities and the public healthcare organizations in Sweden. The public program was initiated by the Foundation for Employment Security Fund for Local and Regional Government in Sweden

(Trygghetsfonden; hereafter called the Employment Security Fund). The Employment Security Fund was originally a partnership between SKL and several unions, which represent a majority of employees in healthcare and municipalities in Sweden.

The public program was inspired by the industry program in Sweden, called the Production Leap (Produktionslyftet), supporting organizations in the Swedish manufacturing industry in implementing lean. The industry program was initiated in 2006 by the employers' federation (Teknikföretagen) and the metalworkers' union (IFMetall) and managed by SWEREA/IVF (a Swedish industrial research institute) and Chalmers University of Technology (www.produktionslyftet.se). Both the industry program and the public program followed a Scandinavian tradition where national programs, i.e., workplace development programs (WPDPs), are introduced to address societal issues, which are run during a limited period of time, cf. Brulin & Svensson (2012) and Gustavsen (1996). The initiation of the industry program was due to the increased global competition from low cost countries and a consequent vision to help and strengthen mid-sized manufacturing companies in Sweden in meeting this competition (www.produktionslyftet.se). The first phase of the program, 2007-2010, responded well in the participating organizations and also turned out well in a national evaluation report (Olsson & Hellsmark, 2012). This positive response made other sectors to take after the concept used in the industry program.

In the public sector of Sweden, in 2010, an equivalent program as to the industry program was initiated, i.e., the public program. The public program offered training courses, ranging between two and ten days, for employees and managers, and seminars, called network reflection meetings, for lean consultants and officials. The public program had very little external funding so the participating organizations paid for the training courses themselves. On-site coaching and lean implementation follow-ups were not offered, as in the industry program. The lean consultants' network was provided free of charge. Steering board meetings were held but had more the character of discussing preliminary results from the research project than to steer activities in the program. Initially, a large number of organizations participated in the public program but to a varying degree. In the second running year of the program, the Employment Security Fund was reorganized and the ownership of the public program was transferred to a private company that continued the activities. As a consequence, the level of

participation in the lean consultants' network as well as the frequency of steering board meetings decreased.

In regard of the public sector context and in particular public healthcare, healthcare organizations are complex systems, characterized by uncertainty and changing circumstances, comprising social, technical and structural components, which is a reason why these organizations need to be viewed through the lenses of socio-technical system thinking (Niepce & Molleman, 1998; Pasmore, 1988). In Sweden, the healthcare context is characterized by on the one hand a human- or personal-oriented approach, high autonomy and democracy, and on the other hand a strong professional hierarchy (Lind, 1993). Furthermore, according to McKee and Healy (2002b), the culture of hospitals is often characterized by prestige including elite members of the medical profession who may oppose to strategies threatening their own role. Such opposition from professionals may result in an inability to implement change in hospitals (Rundall et al., 1998, p. 182).

During the last couple of decades, efficiency and rationalization demands and therefore strategies of change have characterized the healthcare sector in Sweden (Federation of Swedish County Councils, 2002; Hansell, 2005), where especially psychiatry in Sweden has been an area with severe problems and systematic defects (SOU, 2006). In Swedish psychiatry, reduced economic resources, increased number of patients, demands for higher efficiency and legislation relating to prioritization in healthcare are some of the changing circumstances to be handled (Bergin & Rønnestad, 2005).

3.3. Data and Study Samples

The research project included seven organizations, five of whom were part of the public program; one hospital and one municipality included in the research project were not part of the public program. The research project is based on data from three Swedish University hospitals and four municipalities. The project's reference group recommended organizations as participants in the study which were selected by the research group based on variations with regard to operations, experiences of lean and geographical spread, and that top management had a clear vision of lean and explicitly stated that they work in a lean-inspired manner.

3.4. Data Collection

3.4.1. Paper I

In paper I, focus group interviews with first-line managers were used as data collection method at a psychiatry division within a Swedish University hospital. In a focus group interview (Cooper & Baber, 2005; Newman, 2005; O'Donnell et al., 2007; Sharples & Cobb, 2015), which is a group interview, the moderator asks open-ended questions to a group of people. Focus group interviews have been used to collect empirical data since the 1920's (Morgan, 1997) and the reason behind using focus group interviews as data collection method was: the first-line managers in the studied sample was (1) occupied in much work and hence difficult to get hold of (O'Donnell et al., 2007) and (2) the subject that was to be handled in the focus group interviews were considered being of a sensitive nature why it was deemed helpful for the managers to discuss these issues with people having similar experiences (Newman, 2005; O'Donnell et al., 2007). Also, a large amount of opinions could be collected during a fair amount of time (Cooper & Baber, 2005). Furthermore, a platform for joint reflections and learning was aimed for (Wilson & Sharples, 2015).

Consequently, in this qualitative case study, two rounds of focus group interviews were held with all the first-line managers in the division (24 out of 27). The first round was in 2011 and the second round half a year later in 2012. The managers were divided into four groups and a good mixture of unit representation was promoted. At the start, the participants were informed that participation in a focus group was voluntary. The author of this thesis acted as a moderator and another doctoral student took notes during the interviews. Having received approval from the group, the interviews were also recorded on tape.

In the first round of interviews, the topics dealt with were: the managers' view of lean in general, their personal experiences of lean within the hospital and within their own unit, how the managers planned to work with lean, and what they needed in order to achieve successful implementation. The second round of interviews focused on the analysis made from the empirical findings from the first round of interviews, and on different ongoing lean activities at the different units. A summary report was produced from each focus group interview and distributed to the respective groups for validation. All the managers were informed that the reports were deemed research material, supporting the design of a lean education plan at the division. The

Head of Organizational Development supplied complementary information when required. Also, one analysis seminar was planned together with all first-line managers at the psychiatry division, as an additional validation.

3.4.2. Paper II and III

In paper II and III, which included seven public sector organizations (three hospitals and four municipalities) in Sweden, semi-structured interviews and group interviews (Bryman, 2011, p. 206; Kvale & Brinkmann, 2014) were conducted with managers, key players at different organizational levels, and employees: 146 interviews in total.

Three interview guides were used; the first (1) focused on the initiation and organizing of the lean implementation; the second (2) focused on the impact of lean on the work and the employees' perceptions of these impacts; the third (3) focused on the employees' perception of taking part in the work with improvement groups. Interview guide one (1) was used on managers and key players at different organizational levels, while interview guides two (2) and three (3) were used on employees. Extensive notes were taken by the interviewers during the interviews. The interviewees were informed that the interviews were voluntary and that the material would be treated with confidentiality. Also, when permitted, the interviews were audio recorded. The interview notes, which were complemented by the audio recordings when needed, were summarized in seven reports; one to each participating organization. The reports were sent to contact persons, i.e., key players in the development of the participating organizations, for validation and input into their own development work.

To further validate the research findings and to collect new data, analysis seminars (Halvarsson & Öhman Sandberg, 2009; Svensson et al., 2015, p. 353) were conducted: nine analysis seminars in total. The analysis seminars were characterized by a high degree of interactivity where research findings were presented and at times combined with theoretical models. The research findings were jointly discussed and interpreted among the participants and the researchers. Notes from the joint reflections were summarized in a report which was distributed to all the participants of the analysis seminar for comments, as a validation of the research findings.

Furthermore, when the research group met with the reference group (also called the steering group) of the research project, preliminary results were discussed and reflected upon, as an additional validation. The reference

group was also involved in suggesting questions in the interview guides. The research group and the reference group met nine times.

3.4.3. Paper IV and V

Paper IV and V included a longitudinal questionnaire study, in which the questionnaire was distributed twice (T1 in 2011 and T2 in 2013) to employees (paper IV and V) and managers (paper IV) in five of the seven public sector organizations. The questionnaire consisted of questions from the New Working Life ('Det Nya Arbetslivet') (Oxenstierna et al., 2008), LOHP (Leadership/Organization/Health/Production) (Fagerlind Ståhl et al., 2015) and other supplementary questions designed by the researchers in the research group, inspired by the conditions identified in study A and B, see Table 3. The reference group of the research project, as well as key persons in participating organizations, was also involved in giving suggestions concerning the design of the questionnaire. Before distribution, seven representatives from the academia and the public sector in Sweden answered and provided feedback on the design of the questionnaire. Corrections were made when needed in order to ascertain the questionnaire's validity.

Table 3. Items and variables in paper IV and V

	Variables	Scale (points)	Item origin
	<u>Control variables:</u>		
1	Age (High to Low Age)	56	
2	Gender (Male to Female)	2	
3	Educational level (Low to High Level)	7	
4	Hospital (0-1)	2	
5	Manager (0-1)	2	
	<u>Predictor variables:</u>		
	Psychological safety (Low Agreement - High Agreement):		
6	At my work we care about each other.	4	NWL
7	At my work we treat each other with respect.	4	NWL
8	I feel safe and accepted at my work.	4	NWL
9	At this unit people can present ideas without the fear of being called stupid.	5	LOHP
	Personnel stability:		
10	Has any downsizing occurred? (No Extent-High Extent)	5	NWL
11	How did you perceive this? (Worsening-Improvement)	3	SQ
	Development resources (Do not Agree-Agree):		
12	It's easy to get enough resources for the testing of new ideas.	5	LOHP
13	I have time to think in new ways in my work.	5	LOHP
14	We are able to test ideas that have an uncertain outcome.	5	LOHP
	Job control (No, Never-Yes, Mostly):		
15	Are you free to decide how your work is to be done?	4	NWL

16	Are you free to decide what is to be done in your work?	4	NWL
17	Are you free to decide when your work is to be done?	4	SQ
18	Have you enough powers to make decisions in your work?	4	NWL
	Role clarity (Do not Agree-Agree):		
19	All roles and responsibilities are clearly defined in my unit.	4	NWL
20	Each unit's roles and responsibilities are clearly defined in my work.	4	NWL
	Participation in decision-making (No Extent-High Extent):		
21	To what extent do you participate in decision making at the organizational level?	4	NWL
22	To what extent do you participate in decision making at your unit?	4	NWL
	Opportunities to influence (Do not Agree-Agree):		
23	At my unit everyone participates in discussions about the future.	3	NWL
24	At my unit everyone has an impact.	3	NWL
	Information as participation (Do not Agree-Agree):		
25	At my unit we get the information needed to be able to participate.	3	NWL
26	At my unit we get information well in advance of important decisions.	3	NWL
	Job demands (No, Never-Yes, Mostly):		
27	Does your work demand you working very fast?	4	NWL
28	Does your work demand you working very hard?	4	NWL
29	Does your work demand a too big of a work effort?	4	NWL
30	Does your work demand you to put yourself in other people's shoes?	4	NWL
31	Does your work put you in emotionally difficult situations?	4	NWL
32	Do you, in your work, have responsibility of people's lives and personal safety?	4	NWL
	Visual Follow-Up Boards (No Extent-High Extent):		
33	We use a follow-up board.	4	LOHP
34	We use a follow-up board in our improvement project.	4	LOHP
	Standardized Work (No Extent-High Extent):		
35	We work in a standardized manner.	4	LOHP
	5S (Housekeeping) (No Extent-High Extent):		
36	We work according to 5S (housekeeping).	4	LOHP
	Value Stream Mapping (VSM) (No Extent-High Extent):		
37	I participate in VSM work.	4	LOHP
38	I participate in the work aimed at shortening lead times.	4	LOHP
	Outcome variables:		
39	I feel engaged in our work group's Lean work (Do not Agree-Agree).	4	SQ
	Job satisfaction (Very Dissatisfied – Very Satisfied):		
40	How satisfied are you, overall, with the work environment at your work?	4	SQ
41	Are you in general satisfied with your work?	5	LOHP
	Exhaustion (No, Never-Yes, Mostly):		
	How have you felt the last three months:		
42	I have days when I feel wound up all the time.	4	NWL
43	I have days when I feel a lot of pressure, on the verge of what I can manage.	4	NWL

44	I have difficulties relaxing on my spare time.	4	NWL
45	I am often tense.	4	NWL
46	I often have worrying thoughts.	4	NWL
47	I am often restless.	4	NWL
48	I do not feel rested after I have taken it easy for a couple of days.	4	NWL
NWL New Working Life Questionnaire			
LOHP Leadership/Organization/Health/Production Questionnaire			
SQ Supplementary Questions			

A total of 1381 respondents answered the T1 questionnaire (a response rate of 65%) and a total of 1139 respondents answered T2 (a response rate of 51%): a total of 894 respondents answered both T1 and T2. In paper IV and V, results were presented as a part of the overall questionnaire study namely the results from respondents from two hospitals and one municipality (elderly and social healthcare), who answered both T1 and T2, and explicitly stated that they worked according to lean in the healthcare work in T1, (paper IV: n=448, including 56 managers). In paper V, the sample size was n=281 due to only including respondents that had answered the outcome variable idea generation in T1.

All variables were subjectively rated in a questionnaire format, where the respondents were asked to rate how well the described statements fit the description of how they perceived their work environment on a Likert scale. The answers 'Do not know', 'Not applicable', 'Do not want to answer', and 'Something else' were all categorised as missing values. Age, gender, educational level, hospital, and manager (paper IV) were used as control variables, see Table 3.

3.5. Analysis

3.5.1. Paper I

A qualitative content analysis (Hsieh & Shannon, 2005) with a within-case sampling strategy (Miles & Huberman, 1994) was used in paper I. A qualitative content analysis is a research method where the content of a text is subjectively interpreted through a systematic classification process of coding and identifying themes or patterns (Hsieh & Shannon, 2005).

Due to the Scandinavian context and the complex healthcare setting, a socio-technical perspective was chosen as a first step of coding, to identify conditions affecting the managers when implementing lean. Cherns' ten socio-technical principles (Cherns, 1976; Cherns, 1987) were used as a guide.

Statements within the specific topics discussed in the focus group interviews were coded (c.f. Bergin and Rønnestad, 2005) by categorization under Cherns' ten socio-technical principles. Also, citations were condensed from the interview reports and translated to illustrate content examples of the focus group statements.

As a second step of analysis, a framework for sustainable development work (Lindskog, 2014) was used to better understand how the identified conditions, from the first analysis step, affected the sustainability of the lean implementation. In this second step of the content analysis, the same statements used in the first analysis were coded again and collated in categories inspired by Lindskog's framework for sustainable development work in healthcare (2014): Participation and Learning; if people participate in the development work they are also able to learn from mistakes (cf. double loop learning Argyris (1977)), Goal Clarity; to be able to participate people ought to know the objective with the development work, and Role Clarity; clear roles (not meaning a coercive formalization of work processes, cf. Adler & Borys, 1996), as opposed to fuzzy roles, may promote information, knowledge, and learning. By these analysis steps, connections between the sustainability concepts were identified but also how these sustainability concepts were connected to the socio-technical principles.

During the course of the analysis, preliminary results were presented to all participating managers at an analysis seminar, as an additional validation of the analysis. However, only a few of the managers attended.

3.5.2. Paper II and III

The data in paper II was analyzed in three steps, using a qualitative content analysis (Hsieh & Shannon, 2005), (1) coding empirical results into conditions promoting sustainable development programs, according to Brulin and Svensson (2012): organized learning activities, stakeholder ownership, and support for stakeholder participation. Also, (2) work process innovations were identified in all three programs and (3) a comparison between the three programs concerning the degree of each identified condition in step 1 was made both on the local (i.e., participating organizations) and program level, in the three programs. Authors who had insight into two or three programs validated the comparison.

In paper III, which is a book chapter, a qualitative comparison was made between the public program and the industrial program. The same empirical

results from the public program used in paper II were used in paper III but was also complemented by preliminary results from Study C.

3.5.3. Paper IV

In paper IV, engagement in development, job satisfaction, and exhaustion in T2 were analyzed using longitudinal simple and multiple linear regression models; the hierarchical steps in the regression model were inspired by the JD-R model (Demerouti et al., 2001). The different steps in the multiple regression model were the following: 1) control variables; 2) job resources; 3) job demands; 4) lean tools, in T1. The reason for using the hierarchical steps was to examine the amount of variance accounted for by each step and to examine mediating effects, cf. Lin et al.'s (2012) hierarchical analysis model analysing causes, consequences and mediating effects of burnout among hospital employees. For the purpose of comparability, all variables in the study sample (n=448) were standardized with a mean of zero and a standard deviation of one. By examining Cronbach's alpha, the reliability of the indices was tested prior to analysis, where the lowest score was 0.68. All tests were made two-sided at $p < .05$ if not specifically stated otherwise. All statistical analysis was conducted using SPSS 19 (IBM Corporation, USA).

A paired samples T-test was conducted for the three outcome variables (not standardized variables) comparing T1 and T2 in order to account for outcome variable development over time. As a means of analyzing risks of multicollinearity, a Pearson correlation test and a multi-collinearity test were used. None of the tolerance values were found to be below 0.2. Similarly, there were no correlations between the predictor variables higher than 0.54. Also, descriptive statistics were used.

3.5.4. Paper V

In paper V, the same analysis as in paper IV was made using individual innovation, i.e., idea generation and idea implementation in T2 as outcome variables.

By examining Cronbach's alpha, the reliability of the indices was tested prior to analysis, where the lowest score was 0.63. Also, none of the tolerance values were found to be below 0.2. Similarly, there were no correlations between the predictor variables higher than 0.57.

3.6. Methodological Considerations

In order to meet the academic demands of high research quality, validity and reliability needs to be addressed.

Validity could be either internal or external; the internal validity is defined as the agreement between the empirical results and reality, and the external validity is the question of generalizability, hence defined as the correspondence of the results from the sample used to another sample, not used, outside of the studied context (Bryman, 2011). One way to increase both internal and external validity is to use triangulation (Denzin, 2009, p. 300), which can be made by: data triangulation (several data sources), investigator triangulation (several researchers), theory triangulation (multiple perspectives), and methodological triangulation (several methods) (Denzin, 2009, p. 301).

Reliability is defined, in traditional research, as the possibility to repeat the study (Bryman, 2011; Yin, 2003; Yin, 2014). In this thesis, reliability is a problematic term since it is not possible to study the same case again during the same period of time and consequent turn of events. Instead, the case studied is part of an ever-changing context and influenced by many external factors. However, since reliability is also indicating the level of quality of the measurements performed in a study, it is somewhat easier to relate to reliability in quantitative research compared to qualitative research (Bryman, 2011); which is more about words and understanding (Hignett & Wilson, 2004).

One way to relate to reliability in quantitative research is to measure the internal reliability of the indices used in a questionnaire, i.e., Cronbach's alpha (Bryman, 2011). In study C, Cronbach's alpha was at lowest 0.68 in paper IV and at lowest 0.63 in paper V where both are considered as acceptable levels (Nunnally et al., 1967).

Concerning validity in quantitative research, there are a number of different approaches (Bryman, 2011). Face validity is how a concept in a questionnaire is subjectively viewed as covering what it intends to measure (ibid.). In study C, the face validity was considered by letting seven representatives from the academia and the public sector in Sweden answering the questionnaire and giving feedback about items, indexes and scales used in the questionnaire, prior to distribution. Causality is another indicator of internal validity; indicating how possible it is to interpret and draw conclusions about cause and effects in a study (ibid.). In quantitative research, indications of causality can be improved by measuring at two different points in time, i.e., a longitudinal quantitative study (ibid.). In study C, measurements were performed longitudinally. However, to claim causality, several criteria need

to be fulfilled: strength of the association, consistency of the association, specificity of the association, the temporal relationship of the association, the biological gradient, plausibility, coherence with previous theories, experiments, and analogy (Hill, 1965). In study C, there were indications of fulfilling the criteria consistency, i.e., similar results have previously been observed by other researchers; coherence, i.e., generally known facts; and analogy, i.e., similar results have been observed in other research fields. Since the sample size in paper IV (n=448) is larger compared to the sample size in paper V, there was a somewhat stronger indication of causality in paper IV than in paper V. Hence, positive and significant relations seen in the analysis of paper IV were termed “X promoted Y” while in paper V positive and significant relations were termed “X influenced Z”.

As mentioned above, an indicator of external validity, or generalizability, is how representative the chosen sample is for the population studied (Bryman, 2011). In study C, the population includes stakeholders in sustainable organizational development in healthcare. The sample chosen in study C included employees in three Swedish healthcare organizations; where the selection criteria included various types of operations, different experiences of lean, geographic diversity, and whether top management and unions were decisive in implementing lean. Even so, this thesis does not claim to have a high external validity, since the study was not designed to generate empirical data outside of Sweden. However, from a Nordic perspective, the external validity is still believed to be affected by the author using a socio-technical analysis perspective, which is closely related to the Nordic working model (Börnfelt, 2006; Oudhuis & Olsson, 2011; Vänje & Brännmark, 2015). Also, by having discussed and contrasted the research results together with Nordic researchers and practitioners in numerous Nordic research conferences; FALF (Forum för Arbetslivsforskning) 2011 and 2012, HELIX 2013 and 2014, NES (Nordic Ergonomics and Human Factors Society) 2012, NFF (Nordiska Företagsekonomiska Föreningen) 2011, NOVO (Nordic Society Network promoting research and development for increased organizational sustainability in healthcare) 2011, 2012, 2014 and 2015, the external validity is considered to be at least at a moderate level in that the research results are believed to be applicable to healthcare organizations in Nordic countries.

3.7. Ethical Considerations

Ethical principles were followed in the research project according to the regional Ethics Committee of Linköping (IBL-2010-00112), whom approved the study design of the research project. Participants in all of the studies in

the research project received information about the purpose of the study and that only the researchers would have access to the information, from the interviews and the questionnaire, on individual level. Also, information was given about participation being voluntary and that senior management only would get information from the interviews and questionnaire on an aggregated level. The questionnaire responses, in paper IV and V, were handled confidentially and all results were analyzed and presented at department level, ensuring that no individuals could be identified. Interviews, in paper I-III, were only audio recorded when approved by the interviewees; notes and audio tapes were handled confidentially by the researchers. Summary reports from the interviews were distributed to focus group participants and contact persons in participating organizations for approval. The summary reports in paper I was only sent to the Head of Organizational Development after approval by the focus group participants. All managers were also informed that the summary reports were to support the design of a lean education plan at the psychiatry division.

An ethical consideration was that the researchers were introduced to potential interviewees/respondents by management, which may have contributed to interviewees/respondents feeling obligated to participate, even if each interviewee/respondent was informed that participation was voluntary. This can especially have been the case in paper I where the Head of Organizational Development invited the first-line managers, by email, to attend to the first round of focus group interviews. The researcher, and the author of this thesis, informed before starting the first round of focus group interviews that participation was voluntary. At the second round of focus group interviews, which invitation was sent by the author of this thesis, approximately half the number of focus group members chose to turn up. This may have been an indication that some of the first-line managers felt obligated to attend to the first round and chose not to turn up on the second round of focus group interviews, when having been explicitly informed about their free choice in attending at the focus group interview.

4. Main Findings

4.1. Study A

4.1.1. Paper I

From the socio-technical analysis made in paper I the implementation of lean in the case studied was not considered sustainable. This was due to a number of conditions: weak ownership from hospital level, due to a shift in strategy, and traditional power structures in the organization which resulted in unclear roles in the implementation of lean. The shift in strategy from lean to another concept for organizational development had negative effects on the sustainability because durable lean processes were considered as predictors for a sustainable lean implementation. Also, the weak ownership affected the sustainability and socio-technical concepts (principles) goal clarity and stakeholder participation⁴. The absence of clear and measurable goals resulted in a lack of guidance for the first-line managers in the implementation of lean which also made follow-ups of the implementation of lean difficult to manage. A lack of follow-ups negatively affected participation and joint learning among managers and employees in the development process, i.e., the implementation of lean, cf. joint innovative learning.

Also, the first-line managers had unclear roles concerning their responsibility of implementing lean; they lacked power to allocate resources and it was unclear about the psychiatrists, i.e., the physicians, role in the implementation of lean. These unclear roles resulted in frustration among all parties, a lack of ownership of the lean implementation and consequently inhibited participation.

Hence, the main findings from study A (paper I) were: socio-technical principles may be used as indicators of sustainability for lean in Swedish healthcare in which particularly stakeholder participation, joint innovative learning, lack of role/ goal clarity and active ownership played important parts, see Table 4.

⁴ The employer, employees, managers and patients were first and foremost considered as stakeholders of the lean implementation.

Table 4. Conditions influencing sustainable lean implementations in healthcare according to study A

Stakeholders	Conditions influencing sustainability
Employer Employees Managers	Socio-technical principles Active ownership Stakeholder participation Joint innovative learning Role clarity Goal clarity

4.2. Study B

4.2.1. Paper II

The main findings from paper II was that successful management of national lean programs (workplace development programs [WPDP] supporting the implementation of lean) was dependent upon multiple stakeholders: labor market parties, external program funders, management and employees in both the program and in participating organizations. Joint innovative learning among stakeholders in organized learning activities was shown to be a crucial condition for the development processes, i.e., various stakeholders met to articulate their positions. Deliberate ‘triggers’ were placed into organized learning activities: for example, reports on interactive research results or other external input. The amount and quality of organized learning activities, including various stakeholders, was associated with the level of work process innovations in the three programs.

Support for employee participation in the organizations was obtained by coaching, training and education offered by the program. Also, the program coaches and educators participated in the development of the program processes by so called reflection seminars. Even so, the findings did not explicitly point out how the support for employee participation, from the WPDPs, was helpful in generating work process innovations; for example, in building systems for continuous improvement, being an important ingredient of lean, in the local organizations.

Active ownership was shown to be important for program success which involved allocation of resources for the development work, support and interest in it as well as preparedness to make use of the results. The findings showed that work process innovations took place when appropriate owners had the mandate or authority in the development work, and were willing to take necessary steps in negotiating with other stakeholders.

Hence, important conditions for program development processes included: (1) organized joint innovative learning activities among stakeholders, (2) active ownership of both the program and the local lean implementation, and (3) support for employee participation. However importantly, none of these single conditions were by themselves a sufficient condition for successful development processes. Rather, the conditions interplayed within and between the programs and the local organizations of this study. The three conditions supported development processes in both the programs and the participating organizations, however this support was most evident in the lean program for private industry organizations. Outcomes from the development processes seen in the industry program were a standardized coaching method, a joint plan for university courses, company coaching, extensive focus on local top management engagement, a 'future group' planning for a continuation of the program. In the organizations participating in the program, outcomes such as the creation of a lean steering group, a new production system, housekeeping, production steering, and a continuous improvement system were seen. Successful development processes, yielding work process innovations, were seen in two of the three programs included in the study, i.e., not in the public program.

4.2.2. Paper III

In paper III, the findings from the 67 organizations, from either the industry or the public program included in the study, showed huge variations in how lean was interpreted and implemented. A large number of the organizations introduced lean through the use of lean tools but did not emphasize the lean philosophy to any great extent. Commonly applied lean tools were 5S (a tool for improving orderliness, also called housekeeping), daily steering, visualization, continuous improvements, value stream mapping (VSM), and lean training through lean games. Also, most of the implementations of lean were substantially influenced by the socio-technical tradition: an effort to give responsibility and authority to the workers, a high level of participation, learning and development, and a pronounced focus on improving working conditions, as well as low power distances/organizational hierarchies.

Both positive and negative effects were noted concerning the findings about the working environment: in organizations in the industry program, the majority of the employees felt that lean had improved the working conditions, during the study period of one to two years. In the organizations in the public program, the employees on average considered the working conditions to have deteriorated during the same length of study time. The

employees' experience from previous changes in the organization also had an effect. The sustainability of lean was substantially lower than in the manufacturing companies since five of the seven public organizations abolished or substantially reduced their emphasis on lean. In general, it seemed that a change in top management, a short-term focus and a too weak focus on socio-technical principles, i.e., a strong emphasis on economic savings alone with no consideration for the human aspects, were predictors for the perception of a deterioration of the working environment. Notably, where lean in the public organizations was sustainable, the employees indicated an improvement in working conditions. Specific factors indicating positive outcomes regarding working environment and sustainability included a partnership with the union and an active ownership by top management and politicians, which contributed to role clarity, and stability in management involvement and support. Also, a developmental view supported the employees in testing new solutions which again supported motivation and job satisfaction as well as organizational performance.

The identified conditions in study B (paper II and III) which influenced the sustainability of the implementations of lean are shown in Table 5.

Table 5. Conditions influencing sustainable lean implementations in healthcare according to study B

Stakeholders	Conditions influencing sustainability
Labor market parties Union representatives Lean program owner(s)/funder(s) Lean program manager(s) Lean program coaches Owner(s) of organization Manager(s) in organization Employees in organization	Values guided by socio-technical principles Active ownership Joint innovative learning Stakeholder participation Developmental view

4.3. Study C

4.3.1. Paper IV

In paper IV, the findings revealed that both engagement in development and job satisfaction decreased, and the level of exhaustion weakly, but significantly, increased. All job resources, as well as job demands, had significantly decreased over time. The managers showed significantly higher levels of engagement in development and job satisfaction compared to the employees. The employees, as opposed to the managers, experienced a

significant increase in participation in decision-making and no significant difference in opportunities to influence.

Standardized work and VSM significantly promoted both manager and employee engagement in development, both before and after having run the control variables of age, gender, educational level, hospital, manager, and the lean context of job resources and job demands. The addition of lean tools (i.e., standardized work and VSM) partly mediated that female respondents were overrepresented in engaging in development. Visual follow-up boards and 5S did not influence engagement in development. Development resources, such as having time, significantly promoted engagement in development, both before and after having run the control variables, and participation in decision-making tended to promote engagement in development (non-significant; $p \leq .10$). After having run the control variables and the lean context, respondents experiencing a low level of psychological safety were significantly more engaged in development compared to other respondents. Furthermore, older respondents, as compared to younger, indicated being more engaged in development (non-significant; $p \leq .10$).

Standardized work and 5S significantly promoted job satisfaction, and there were indications that these lean tools mediated the effect of psychological safety, after having run the control variables and the lean context. VSM only significantly influenced job satisfaction in the simple linear regression model. There were indications that visual follow-up boards had an inhibiting effect on job satisfaction ($\beta = -.11$, $p = .12$). Development resources tended to promote job satisfaction (non-significant; $p \leq .10$). Personnel stability and low levels of job demands had a significant influence upon employee job satisfaction. Older respondents, as compared to younger, were more satisfied with their work.

None of the lean tools influenced employee and manager exhaustion. Low levels of development resources and high levels of job demands significantly influenced exhaustion, both before and after having run the control variables. Younger respondents, as compared to older, were more exhausted.

4.3.2. Paper V

In paper V, the findings revealed that employee individual innovation (idea generation and idea implementation) significantly decreased over time; which was more notable in hospital 1. For the employees in the municipality and in hospital 2, no significant differences in individual innovation could be identified. With regard to the lean context, there were less personnel

stability, participation in decision-making, and information as participation in the hospitals as compared to the municipality. Also, the hospitals significantly used visual follow-up boards and standardized work to a higher degree. Both the hospitals and the municipality used VSM to a lesser extent compared to the other lean tools.

The lean tools 5S and VSM both significantly influenced idea generation among employees. Development resources ($\beta=.24$, $p=.08$) and employees lacking in information as participation ($\beta=-.23$, $p=.06$) were weakly associated with idea generation. There were also indications that lean tools mediated the effect of development resources and a lack of information as participation. It could not be confirmed that visual follow-up boards or standardized work had an influence upon idea generation. There were indications that male employees were more likely than female employees to suggest ideas, even when the majority of the sample consisted of women (87.2%). When controlling for physicians, the significant relationship ($p\leq.10$) between gender and idea generation became non-significant ($n_p=12$, 6 male and 6 female).

The same lean tools as for idea generation, i.e., 5S and VSM, had a positive relationship to idea implementation. It could not be confirmed that visual follow-up boards or standardized work had an influence upon idea implementation. Development resources and employees lacking in information as participation significantly influenced idea implementation. There were weak indications of lean tools, i.e., 5S and VSM, partly mediating the effect of development resources and a lack of information as participation on idea implementation.

In study C, conditions which influenced sustainable implementation of lean are shown in Table 6.

Table 6. Conditions influencing sustainable lean implementations in healthcare according to study C

Stakeholders	Conditions influencing sustainability
<p>Employees Managers</p>	<p>Development resources^{a/b/c/d} Participation in decision-making^a Information as participation^d Psychological safety^{a/b} Personnel stability^b Job demands^{b/c} Standardized work^{a/b} VSM^{a/d} 5S^{b/d}</p>
<p>^a Engagement in development ^b Job satisfaction ^c Exhaustion ^d Individual innovation</p>	

4.4. Summary of Main Findings

For a summary of the main findings in the explorative, interpretive, and explanatory studies (A-C: papers I-V), and consequently identified conditions which influenced the sustainability of the implementation of lean in the studied sample, i.e., the public sector in Sweden, see Table 7.

Table 7. Summary of main findings: Conditions influencing sustainable implementation of lean in the public sector

Factors influencing the sustainability of lean in the public sector	Paper I	Paper II	Paper III	Paper IV	Paper V
Job resources and job demands:					
Values guided by socio-technical principles	•		•		
Active ownership	•	•	•	•	•
Joint innovative learning	•	•	•		
Stakeholder participation	•	•	•		
Developmental view			•		
Job resources:					
Psychological safety				•	
Personnel stability				•	
Development resources				•	•
Role/goal clarity	•				
Participation in decision-making				•	
Information as participation					•
Job demands				•	
Lean tools:					
Standardized work				•	
5S					•
VSM				•	•
Sustainability outcomes:					
Engagement/Motivation in development	•	•	•	•	
Job satisfaction			•	•	
Exhaustion				•	
Innovation		•			•

5. Discussion

The objective of this doctoral thesis is to identify conditions promoting sustainable development in the public sector, in particular the healthcare sector, when implementing lean. The implementations of lean in the public sector, which were elaborated on in three studies (A-C: paper I-V); longitudinal qualitative (paper I-III) and quantitative (paper IV and V), elucidated different aspects of sustainable development in the public sector, including different stakeholders: labor market parties, union representatives, national lean program owners/funders/managers/coaches, county politicians, and managers/employees in the public sector. Based on the results from these studies, some conclusions on conditions promoting sustainable development in the public sector can be drawn, which are summarized in Figure 2. In general, the implementations of lean, in the samples of the public sector in Sweden in this thesis, were not considered sustainable.

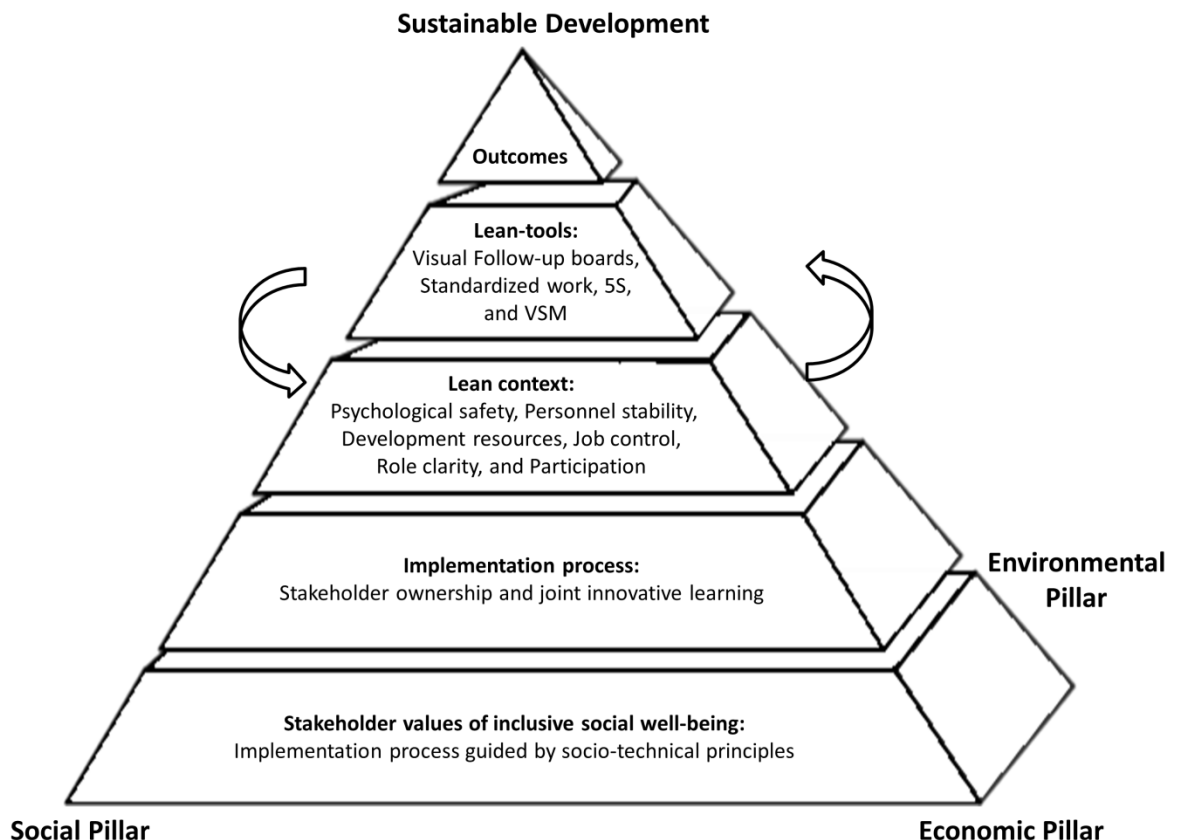


Figure 2. A summary of conditions promoting sustainable development in the public sector, in particular the healthcare sector

5.1. Stakeholder Values and Socio-Technical Principles

Through the course of this thesis, analyzing implementations of lean, a common strategy for reorganization in the public sector of Sweden (Brännmark et al., 2012), the understanding of sustainable development continuously evolved. Especially, an understanding was raised about the importance of stakeholder values being guided by inclusive social well-being (Matson et al., 2016) which in the reorganization of work means considering the needs of the employer (productivity), employees (good working conditions), and the patients/citizens (improved quality of care: work process innovations); cf. Matson et al.'s (2016, p. 15) definition of human well-being. In paper I, the perspective of inclusive social well-being was operationalized by using a socio-technical perspective, including values of organizational democracy, participation and autonomy (Börnfelt, 2006; Oudhuis & Olsson, 2011; Trist & Bamforth, 1951; Vänje & Brännmark, 2015), which is claimed to promote employee engagement and efficient and effective processes (Shah and Ward 2007). From the socio-technical perspective in paper I, a lean implementation process characterized by active stakeholder ownership, stakeholder participation, and joint innovative learning were identified conditions for a sustainable implementation of lean. These conditions were also identified in paper II and III; active ownership was also identified in paper IV and V. Joint learning among stakeholders, e.g., county politicians, union representatives, managers, and employees, as a strategy for promoting work process innovation, i.e., joint innovative learning (Nonaka & Takeuchi, 1995), is claimed to be a key concept in sustainable work organizations (Kira & van Eijnatten, 2009), which the results from this thesis confirmed. In paper II and III, joint innovative learning was promoted through lean coaches, in the industry program, supporting participation and learning by questioning established methods, encouraging reflections, and did follow-ups among employees and managers. Also, joint innovative learning was promoted through several reflection and analysis seminars among stakeholders in the national lean programs. Stakeholders in the public program were researchers, program funders, county politicians, union representatives, program management, management in organizations, and employees.

However, joint innovative learning among stakeholders was not appropriately promoted in the studies of this thesis due to the implementation processes being characterized by weak stakeholder ownership; on strategic level (paper I, III-V) and on a national lean program level (paper II). Also, due to a top-down implementation approach which

may often be regarded with mistrust by healthcare professionals (Choi et al., 2011). Furthermore, an absence of goal/role clarity⁵ among first-line managers, a lack of follow-ups and a lack of development resources in the implementation of lean influenced the socio-technical principle of stakeholder participation negatively. The unclear roles among the first-line managers, concerning power and authority, especially between them and the physicians, influenced the first-line managers' ownership of the implementation of lean as well as participation negatively. Stakeholder participation is claimed to be a critical sustainability condition (Börnfeldt, 2006; Oudhuis & Olsson, 2011; Vänje & Brännmark, 2015) by for example promoting employee engagement (Eklund et al., 1998). In paper IV, participation in decision-making was positively associated with engagement in development. However, manager and employee engagement in development, as well as job satisfaction, significantly decreased (the level of exhaustion significantly increased). Also, the level of individual innovation significantly decreased why the results revealed that the socio-technical principles, as well as inclusive social well-being, were not fulfilled and why the implementations of lean were not considered sustainable. Also, in paper I, the implementation of lean was not sustained over time, i.e., not durable, but instead replaced by another reorganization strategy.

5.2. Lean Context

According to the results, the lean context was indicating being unfavorable, i.e., job resources and job demands were not balanced, as they often not are in healthcare (McCann et al., 2015). The unfavorable lean context had an influence on the sustainability of the lean implementations, i.e., engagement in development, job satisfaction, exhaustion, and individual innovation. Previous research has pointed out the importance of job resources balancing job demands for employee well-being and health at work (Demerouti et al., 2001) as well as in promoting innovation (Shalley & Gilson, 2004; Terziovski, 2010; Wernerfelt, 1984). The influence of job resources was most evident for the employees and managers' job satisfaction but they also influenced engagement in development and exhaustion; not equally evident for short-term individual innovation. In paper V, the results revealed that the level of individual innovations decreased after three years indicating that individual innovation was difficult after the 'easy targets' had been taken care of and that a continuation of individual innovation may be more

⁵ Clear roles do not mean a coercive formalisation of work processes, i.e., organizational asymmetries in power and knowledge, which has negative effects on participation, creativity and engagement (Adler, P.S. and Borys, B., 1996).

dependent on a supportive lean context, where job resources balance the job demands. Other research has also pointed out a possible dip in engagement in lean among employees after one to three years (Eriksson et al., 2016) and lean in a public sector hospital even became a fad after three years (McCann et al., 2015). Paper IV, revealed that the level of job resources had in general significantly decreased during the implementation of lean where the managers showed significantly higher levels of engagement in development and job satisfaction compared to the employees; while the employees experienced significantly more participation in decision-making over time. Accordingly, the results indicated that the job resources were not balanced against the job demands (Demerouti et al., 2001) and that this was particularly the case for healthcare employees. Previous research have demonstrated that operative healthcare managers are key actors in implementing development work, such as lean, as they have a major role in coaching employees to participate in the development work (Andreasson et al., 2015; Dopson & Fitzgerald, 2006). However, our results may indicate a support for claims about the widespread implementation of lean possibly being an act of expected management decisiveness in order to develop the organization according to the stakeholders', e.g., county politicians', expectations (Hasle, 2014).

Important job resources were development resources (for engagement in development, job satisfaction, exhaustion, and individual innovation), participation in decision-making (for engagement in development), and personnel stability (for job satisfaction), cf. Ahgren & Axelsson (2007), Terziovski (2010), Winkel et al. (2015), and Waring & Bishop (2010). Interestingly, professionals experiencing a deficiency of information, so as to be able to participate, and low levels of psychological safety were more engaged in development and suggested, as well as implemented, ideas more frequently. Additionally, older professionals were more engaged in development. These results may confirm that lean can be a means to resolve age-old frustrations with prior work systems (McCann et al., 2015).

5.3. Lean Tools

In regard of the lean tools, the results revealed that, when supported by job resources, standardized work (influenced engagement in development and job satisfaction), VSM (influenced engagement in development and individual innovation), and 5S (influenced job satisfaction and individual innovation) positively influenced sustainable development through the implementation of lean; which in paper IV and V was operationalized by

engagement in development, job satisfaction, or individual innovation while not exhaustion. When not supported by job resources, visual follow-up boards indicated inhibiting employee and manager job satisfaction.

Furthermore, through the use of standardized work and VSM, psychologically unsafe professionals may have felt empowered to engage in development. Through the use of 5S, as well as VSM, healthcare employees also perceived as if they got information so to be able to participate and to have time for development, i.e., access to development resources, when suggesting ideas. The employees' perception of having time may be explained by the character of the lean tool VSM in which employees may be freed of any other responsibilities and focus on a key area or process, cf. Rapid Improvement Event (McNichols et al., 1999). Such an interruptive event from daily routines as using the lean tool VSM will likely generate engagement in development, as opposed to standardized work which is often incorporated in daily routines. Furthermore, the results in paper V indicated that VSM, and 5S, may be a good strategy to engage male physicians in suggesting ideas of improvement; previous research has pointed out equality as important in healthcare development (Mohammad Mosadegh Rad, 2006). Consequently, VSM may be considered as a central lean tool. However, according to the results in paper IV, this lean tool was less common as compared to the other lean tools and more prevalent among the healthcare managers. Accordingly, the results indicated that VSM may promote sustainable development if supported by job resources and if not considered as an activity more suitable for management.

In summary, the results indicated that lean tools may counteract a poor implementation process and a poor lean context. This can be compared to another study showing that engagement in clinical development work increased in hospital units that had more applications of lean tools (Dellve et al., 2016). The results in this thesis revealed that standardized work, 5S, and VSM may be such enabling lean tools but only to a limited degree.

5.4. Implications for Implementation

This thesis demonstrates the complexity surrounding sustainable development in the public sector, including multiple stakeholders, and the importance of considering not only lean tools when implementing lean, cf. Radnor & Osborne (2013). Inspired by Hines et al.'s (2008) sustainable lean iceberg, illustrating the importance of having a foundation of conditions, enabling an engaged workforce, and using a range of tools under such

enabling conditions (Radnor, 2010), the sustainable development pyramid in Figure 2 illustrates the conditions which may promote sustainable development in the public sector, according to this thesis. This sustainable development pyramid can also be compared to the philosophy of lean, stating that lean is not just a set of lean tools but also based on values as well as principles, i.e., an implementation process and a lean context, in order for an implementation of lean to be successful (Liker, 2004; Womack et al., 1990). Since lean needs to be translated into the context in which it is to be implemented (Langstrand, 2012), the sustainable development pyramid may be used in the translation of lean, and its implementation, so to sustainably develop public sector organizations in Sweden.

However, sustainability is a dynamic state of becoming, being, and staying sustainable which may be compared to a pendulum movement swinging between the needs of stakeholders, e.g., employer and employees, in the organizational development. Historically, such pendulum movements; which swings can be seen as purposeful efforts among different stakeholders (employer and employees) in meeting their needs, have been seen in industry: Scientific Management (Taylor, 1911), Human Relations (Mayo, 1945), TQM (Deming, 1986), and lean. For lean to be sustainable, pendulum equilibrium of inclusive social well-being needs to be reached among the stakeholders affected by lean. Public sector organizations, characterized by complex organizational structures (Lind, 1993), as all organizations which develop from entrepreneurial organic to hierarchical mechanistic organizations over time (Abernathy & Utterback, 1978), tend to focus on structure, often hierarchical and rigid, goals, and rules with few rewards for innovations (Utterback, 1994). Due to the organizational inheritance of such structures and routines (North, 1990; Steinmo et al., 1992), organizational change in mature organizations, such as healthcare, takes time: the lead time between drawing up a plan and obtaining appropriate job resources can take many years in healthcare (McKee & Healy, 2002a, p. 53). One needs to bear in mind that the largest changes made in healthcare, in reducing healthcare costs, have not been effectuated by carefully planned processes but were rather due to war or economic collapses (McKee & Healy, 2002a, p. 33), cf. the social and economic development seen in Europe after World War II (Blomqvist, 2007; Piketty & Goldhammer, 2014). Developing public sector organizations is not unproblematic (Blomqvist, 2007; McKee & Healy, 2002a) and if societies are to succeed in meeting the increased pressure and need for efficiency in public healthcare, continued strategies of change are inevitable. These strategies, as according to this thesis, need to account for

the implementation process, including stakeholder ownership and joint innovative learning, guided by socio-technical principles and a lean context including a balance between job resources and job demands. If these conditions are accounted for, lean tools may promote sustainable development in the public sector through the implementation of lean.

5.5. Method Discussion

The research in this thesis has dealt with sustainable development. This kind of research is not an exact science which can be illustrated by a quote by Piketty and Goldhammer (2014) about social scientific research:

"Social scientific research is and always will be tentative and imperfect. It does not claim to transform economics, sociology, and history into exact sciences. But by patiently searching for facts and patterns and calmly analyzing the economic, social, and political mechanisms that might explain them, it can inform democratic debate and focus attention on the right questions. It can help to redefine the terms of debate, unmask certain preconceived or fraudulent notions, and subject all positions to constant critical scrutiny. In my view, this is the role that intellectuals, including social scientists, should play, as citizens like any other but with the good fortune to have more time than others to devote themselves to study (and even to be paid for it – a signal privilege)." (Piketty & Goldhammer, 2014, p. 3)

In this thesis an interactive research approach was chosen. This choice was based on a desire to support the participating organizations, in the research project, in their quest for sustainable development. Another particular purpose of this choice was to get access, take part, learn and validate the research results in practice. Also, rapid and recurrent feedback to the practitioners made joint reflections and learning among the practitioners and researchers possible (Aagaard Nielsen & Svensson, 2006).

For the author of this thesis, the interactive research has meant hard work in playing an active part in the research process (Svensson & Aagaard Nielsen, 2006; Svensson et al., 2015) in which the interactive researcher must be able to cooperate with the participants in different environments and at different organizational levels (ibid.). In such work, a social competence and a democratic attitude is needed in creating trust, mutual relations and an open and liberal climate, which are important preconditions for a joint learning process to take place (Svensson & Aagaard Nielsen, 2006). However, the interactive researcher must avoid becoming 'one of the gang' so to maintain a critical distance, which is a challenging balancing act (Wallo, 2011). In order to fulfil a critical distance, a key person in the participating organizations was contacted, by recommendation from the reference group. This contact person was responsible to manage knowledge feedback from the interactivity into the organizational strategy concerning the implementation of lean: the

contact persons received summary reports including interview notes and preliminary research results. Also, the contact persons provided suggestions on interviewee candidates and their email addresses, so to be able to distribute the questionnaires. By using a contact person, a critical distance in the interactive research was aimed for.

Methodological limitations included the fact that at the time of implementing lean in paper I, the studied case was also planning for a move to new premises. These plans were in line with the lean strategy but may have affected the attitude to the work of implementing lean. However, the case study in paper I was considered valid through offering all participants the opportunity to give feedback interactively on the empirical data.

In paper II and III, the three research projects were not originally designed for the comparative study used, which created some difficulties when performing the analysis. However, the longitudinal design and vast amount of data can partly compensate for this. Further, the lean practices were different in each participating organization. There are also systematic differences between lean practices in different branches, something that might have influenced the results which was not addressed in these papers.

In paper IV and V, one must consider that the chosen variables only covered some job resources that had an impact upon employees and managers' engagement in development, job satisfaction and exhaustion, as well as employees' individual innovation. These chosen variables were however identified in paper I-III. Another limitation of paper IV was the relatively high level of missing values for the item engagement in development. However, the explained variance of all regression models was considered acceptable and the level of missing items for engagement in development was considered being in line with the conclusions made, i.e., there was a decrease over time in engagement in development for both managers and employees.

In paper V, the sample used indicated a possible low usage of the lean tool 5S. This was deemed as a limitation. Another limitation may have been the high level of missing items in the outcome variable idea implementation in T1, which may have affected the paired samples T-test in analyzing the development of outcome variable over time. Furthermore, the intended contribution of paper V was to clarify the empirical evidence surrounding the successful implementations of lean in healthcare. However, it could be that

workplaces that are good at implementing ideas may also be workplaces that are more successful in applying lean.

The information about the lean implementation process in paper IV and V is not complete but constitutes the available information. Also, studying the influence of lean tools in organizations that show a decline in working conditions and individual innovation may be cumbersome. However, analyzing which job resources and lean tools influence sustainable implementations of lean, may also be especially interesting in such a context (Winkel et al., 2015).

6. Conclusion and Future Research

Conditions which may promote sustainable development in the public sector, when implementing lean, were in this thesis found to be: stakeholder values of inclusive social well-being, an implementation process including stakeholder ownership and joint innovative learning, and a lean context: balancing job resources and job demands. Central lean tools for engagement in development, job satisfaction, and individual innovation were found to be VSM, standardized work, and 5S when supported by a favorable lean context, which includes a balance between job resources and job demands. When not supported by a favorable lean context, visual follow-up boards inhibited employee and manager job satisfaction.

In public healthcare, findings from this thesis showed that development resources, such as time, influenced engagement in development, job satisfaction, and employee individual innovation. Participation in decision-making influenced engagement in development and information, as to be able to participate, influenced employee individual innovation. Personnel stability, in terms of low levels of downsizing, influenced public healthcare employee and managers' job satisfaction.

With regard to lean tools, the results from this thesis show that they may empower public healthcare employees to engage in development, i.e., in implementing lean, when supported by job resources. Furthermore, lean tools may counteract a poor implementation process and a poor lean context in the short term. The results indicated that the lean tools VSM, standardized work and 5S may be such countermeasures but only to a limited degree. In the studies of this thesis, the lean contexts were unfavorable, i.e., a weak implementation process and job resources not balancing the job demands. Hence, the lean implementations studied could not be considered sustainable.

In the unfavorable lean context in this research (i.e., a weak implementation process and job resources not balancing the job demands), the lean implementations could not be considered sustainable.

Research on lean and sustainable development in the public sector is limited and differentiated, regarding the influence from the lean context and the implementation process on engagement and employee well-being. The practical implication of this research may be that stakeholders such as county politicians, union representatives, employers, managers, as well as

employees may be guided in promoting sustainable development when supporting and engaging in the implementation of lean in the public sector. However, further empirical research is needed including a wider empirical base and other contexts, for example other Nordic and European public sector organizations, including managers, employees as well as patients/citizens. Also, one must consider that the chosen variables in this thesis have only covered some job resources (i.e., parts of the lean context) that influence engagement in development, job satisfaction, exhaustion, and individual innovation. Additional conditions influencing sustainable development in the public sector also needs to be elaborated on.

Acknowledgement

Just as Piketty and Goldhammer (2014) put it: it has been a true privilege to be able to do research on an issue which is so important in contemporary societies as sustainable development. I do not argue that this thesis will “inform democratic debate and focus attention on the right questions” but I do hope that this thesis may contribute to reflections, discussions, and joint innovative learning in line with sustainable development in the public sector. Even if I am grateful for having got this opportunity, it has not come for free.

Writing the final section of this doctoral thesis, I ask myself; how a journey of six years can be summarized so to illustrate all the time and energy that have been invested in this work? I have come to the conclusion that such a description will come short. Instead, I want to express my sincere gratitude to my friends, colleagues, supervisors, and not the least my family whom all have shared this journey with me, and some of whom are in the middle of a similar journey right now.

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