THESIS FOR THE DEGREE OF LICENTIATE OF ENGINEERING

Designing work in production:

Balancing top-down job design and bottom-up job crafting

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Abstract

With increasing global competition and technological progress, production companies face new demands to stay competitive and innovative. To achieve this, it's essential to better involve the production personnel. New ways of shaping production jobs are therefore necessary, so that individual employees have a chance to grow, develop, and challenge themselves to reach motivation and continuous learning. When development in production is rapid, operators need to be innovative and involved in finding new solutions.

Job design has traditionally been viewed as a top-down activity, where employees have little influence and are merely expected to fulfil their designated tasks. A contrasting bottom-up activity is job crafting, where individuals reshape their work to better meet their individual needs. The strictness of the imposed job design can vary, through clear or vague job descriptions and differing levels of opportunities for job crafting. It is not obvious what the optimal balance is between the two to reach a sustainable work situation where individual needs are met while also upholding performance and meeting company goals.

This thesis aims to explore the balancing between top-down job design and bottom-up job crafting in the context of operational jobs in production. In doing so, two papers are included. The first paper is an interview study on job crafting practices of front-line managers in production, while the second paper focuses on implementing a work design intervention for increased organizational learning in production teams. Findings suggest that front-line managers have vague job descriptions and role overload, leading to a work situation where both proactive and reactive job crafting practices are extensively used. In contrast, operators in production teams instead have very strict job descriptions with limited autonomy and learning opportunities, and little opportunity to shape and redesign their own work.

Achieving simultaneous control and flexibility by finding a balance between top-down job design and bottom-up job crafting is a challenging task but holds the potential for combining increased performance and competitiveness for the organization with sustainable work conditions for the individual. An improved work design can aid in meeting increased demands for learning and motivation, leading to enhanced innovation and adaptability in the production industry.

Keywords: work design, job design, job crafting, production, operators, front-line managers, behavioral operations, action research, interview study

List of appended papers

Paper 1:

"Designing work: Proactive and reactive job crafting practices of front-line managers in production".

Edén, E., Ollila, S., and Wänström, C.

Status: To be submitted to an OM journal. This paper has previously been presented in an early version at the EurOMA conference 2021, rewritten and presented at the EurOMA publishing workshop in 2022, submitted and reviewed in an OM journal but rejected due to being perceived as mainly a psychology paper. The version presented in this thesis is a revised manuscript with clearer positioning in OM.

Author contribution: Elin Edén was the main author of this paper and conducted much of the work independently, including holding most interviews, doing main parts of the data analysis, and writing the first draft. Carl Wänström participated in interviews with senior managers, while Susanne Ollila participated in analyzing those interviews and creating a data structure. All three authors joined in theoretical considerations and discussions, as well as editing and expanding the early draft to a full paper.

Paper 2:

"Developing a structure for organizational learning through a people- and learning-centric continuous improvement model".

Wänström, C., Edén, E., Kaulio, M., Kullberg, S., Hallin, M., Skagert, K., Rapp Ricciardi, M., and Larsman, P.

Status: Under review in an OM journal.

Author contribution: Elin Edén was the second author of this paper and participated in data collection as well as data analysis and writing. She contributed to large parts of the theoretical framework (focusing on learning and motivation) and participated in the reviewing, editing, and revising of the full paper. Carl Wänström was the main author of the paper, leading the project group through the writing process and contributing to substantial parts of the writing. The remaining authors also participated to different extents in data collection, analysis, writing, and revising of the paper.

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"But endurance had always been my virtue, and I kept on."

In "Circe", Madeline Miller

I know that most PhD journeys come with challenges. This first half of mine also came with the usual challenges, with the added difficulty of a world-wide pandemic that struck when I had just started. But this year when my life changed forever, my endurance and capacity have been tested beyond that. Thankfully, I have had supportive people around me, and I want to take this opportunity to show my gratitude to them.

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Gothenburg, November 2023

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1. Introduction

In pursuit of transformation into more innovative and adaptable organizations, it becomes increasingly clear that focusing on the human element within production is just as important as technical specifications (Hines et al., 2022; Kristensen et al., 2022). By taking into account the well-being and motivation of the workforce and by promoting a culture of continuous learning and development, companies can ensure innovation, growth, and adaptation, leading to sustained success and competitiveness in a dynamic global market (Hines et al., 2022; Kaasinen et al., 2020; Saabye et al., 2022). Consequently, a more profound understanding of how work design influences employee behavior is necessary to ensure not just the technical aspects of production but also the overall work experience.

The production industry is characterized by standardized tasks, especially within lean production (Kuhlang et al., 2011; Lander & Liker, 2007). While standardization is an efficient practice that optimizes processes, it carries the potential risk of rendering the work performed by production personnel as repetitive and non-developmental (Beraldin et al., 2022). In a global landscape marked by intense competition in the production sector, it is crucial for companies to maintain innovation capacity and efficiency. To achieve this, it's essential to better involve the production personnel (Hines et al., 2022). A key factor in this is to examine how their work design affects behavior and needs, and consequently, motivation and learning. Front-line managers are also critical for the success of production companies. They play a vital role in daily production and in leading and engaging the production personnel (Kathuria et al., 2010; van Dun & Wilderom, 2021). As such, it is important to consider their work design and work situation, as these factors have significant consequences for the overall performance and job satisfaction of the workforce.

Beyond its importance for results and competitiveness, work design is also important for the individual. Having a job that fulfils your individual needs leads not only to better performance but also to enhanced well-being and motivation (Deci et al., 2017). Improving work design is also aligning with the UN Sustainable Development Goal no. 8 of Decent work and economic growth (UN, 2015).

The term ‘job design’ refers to the content and organization of tasks, while the broader term ‘work design’ also includes activities, relationships, and responsibilities that shape work (Parker et al., 2017). Job design has traditionally been viewed as a top-down activity, where employees have little influence and are merely expected to fulfil their designated tasks. However, work design in an expanded sense includes activities that employees themselves perform to change their jobs (Parker, 2014). Through job crafting, individuals reshape their work through task, cognitive, and relational crafting practices to better meet their individual needs (Wrzesniewski & Dutton, 2001). This represents a bottom-up approach to work design which contrasts with, or complements, traditional top-down job design perspectives.

The balancing between top-down job design and bottom-up job crafting, in the context of operational level jobs in production, is what this thesis aims to explore.

Crafting to meet individual needs is mainly seen as a proactive strategy, which is increasingly studied in different domains in life such as leisure crafting (Petrou & Bakker, 2016), home crafting (Demerouti et al., 2020), off-job crafting (Kujanpää et al., 2022), and crafting across domains (De Bloom et al., 2020; Kosenkranius et al., 2023). As such, crafting for need satisfaction can be viewed as a responsibility of the individual in the context that they are in. However, in the work domain, the responsibility is not merely at the individual level but at the organizational level as well. Being an employer entails a responsibility for not

just organizational results but also the well-being of employees. Consequently, there is a need for organizations to better understand and improve work design in production and its consequences for the employees who work on an operational level, i.e., operators and front-line managers. In addition to structural job design, it is important to understand the implications of individual work design strategies such as job crafting when individual needs are not met.

The strictness of the imposed job design can vary, through clear or vague job descriptions and differing levels of opportunities for job crafting. It is not obvious what the optimal balance is between the two to reach a sustainable work situation where individual needs are met while also upholding performance and meeting company goals. A strict job design gives more control to the employer, while more room for job crafting enhances the responsibility of the employee to shape the work. When exploring this balancing between top-down job design and bottom-up job crafting, I want to make a contribution to the operations management literature on how to design jobs in production. In doing so, this thesis adds to the emerging research stream on behavioral operations, which takes an interest in less rational and predictable behavioral work patterns affecting operations, exploring the intersection of human behavior and system behavior (Boudreau et al., 2003; Donohue et al., 2020; Gino & Pisano, 2008).

Outline of the thesis

Chapter 1 presents the background and aim of the thesis. In the second chapter, the theoretical framework is presented, providing an overview of behavioral operations, new demands on production personnel, motivation, work design, and job crafting. This is followed in the third chapter by explaining the applied methodology and research design. Chapter 4 provides a summary of appended papers, which is followed by discussion of the findings in chapter 5. Lastly, I present managerial implications and suggestions for future research.

2. Theoretical framework

In this chapter I present the theoretical framework that has been used to design the studies and analyze the empirical data. As mentioned in the introduction, several research streams are relevant to understand how work is designed and its implications in production. This chapter starts with positioning the research within behavioral operations, and then describes new demands on production personnel and how this relates to organizational learning, motivation and individual needs, work design, and job crafting.

2.1 Behavioral operations

Behavioral operations is a sub field within operations management (OM) that takes an interest in how people behave within an operating system. A starting point for the behavioral operations field was an article by Boudreau et al. (2003), where they aimed to bridge human resource management (HRM) and OM, proposing a framework that integrated behavioral insights from HRM with OM's contextual perspectives. They emphasized four key elements for understanding work behavior: capability, opportunity, motivation, and understanding. These factors are vital for comprehensive OM models, as they impact individual performance in production. Bendoly et al. (2006) extended this research, reviewing behavioral assumptions in OM models and suggesting they be tested further, particularly in laboratory experiments. Gino and Pisano (2008) formally introduced the concept behavioral operations, stressing the importance of the rationality assumption in OM and advocating for the inclusion of behavioral and cognitive factors in OM research. Behavioral operations treats human behavior as central to operating systems. Bendoly et al. (2010) highlighted how cognitive psychology, social psychology, group dynamics, and system dynamics enrich

OM models by providing insights into behavior, motivation, group dynamics, and system-level effects. These areas enhance the predictive power of OM models.

Following early influential articles, research in behavioral operations expanded significantly. Over the next decade, studies delved into areas such as rationality, trust, and decision-making, with a focus on supply chain and inventory management (Donohue et al., 2019). Smaller research streams emerged in procurement, auctions, service operations, project management, revenue management, forecasting, quality management, capacity management, new product development, production management, and process improvement.

However, there are still topics that need to be explored further within the behavioral operations field, related to production management. As Boudreau et al. (2003) raised, training and motivation are important aspects for optimal performance, and the work context is an integral part of creating the right conditions for this. While some research has been done within this area, it has often not been positioned within the behavioral operations field.

Croson et al. (2013) state that three aspects need to be met in behavioral operations research. First, that the research is behavioral in nature, which includes viewing actors as non-hyper-rational. Second, that the research deals with understanding operations processes. And third, that it has a micro-level unit of analysis, i.e., focuses on individuals or small groups rather than the organizational level (relating more to organizational behavior than to organization theory). As Donohue et al. (2020) put it, we need more research about behavior in different work contexts to inform better system design.

The three aspects mentioned by Croson et al. (2013) are met in this thesis by the research being behavioral (taking an interest in how job crafting practices are used), dealing with operating processes (how work in production is designed), and focusing on individuals and teams (managers and operators).

To understand these topics, knowledge from closely related fields needs to be used, including organizational learning, motivation theory, and work design.

2.2 New demands on production personnel

With new technological progress and increasing global competition, the production industry faces new demands to stay competitive and innovative. Increased digitalization, including Industry 4.0 adoption, demands changes in the organization and development within production. An important factor is increasing operator competencies and developing a learning-to-learn capability (Kristensen et al., 2022; Saabye et al., 2022). Operators need increased skills and capabilities (Kaasinen et al., 2020), including employee involvement for continuous improvement (Beraldin et al., 2022). When development in production is rapid, operators need to be innovative and involved in finding new solutions (Kaasinen et al., 2020). To achieve this, new ways of shaping production jobs are necessary, so that individual employees have a chance to grow, develop, and challenge themselves to reach motivation and continuous learning (Hines et al., 2022) while also keeping up with everyday production. Lean production thus needs to extend from being focused on production tools for efficiency to being a learning system with structures for organizational learning (Hines et al., 2022; Kristensen et al., 2022). In addition to operators, front-line managers are also key players in operational level production. The work of front-line managers affects operational performance (Kathuria et al., 2010; van Dun & Wilderom, 2021) as well as employee well-being (Huo et al., 2022), development, and learning (Wallo et al., 2013). Thus, it is essential to make sure that front-line managers have the necessary prerequisites to perform their job.

Organizational learning is an important factor in a company's ability to adapt to contextual changes and for continuous renewal (Crossan et al., 1999). For

example, when there are sudden changes in market demands or novel technologies are introduced, adapting to such changes through new ways of working is crucial to stay competitive. A related concept is the learning organization, which is an organization that has the capacity to transform itself with continuous learning (Watkins & Marsick, 2019) and has a systematic way of increasing learning in the organization (Watkins & Kim, 2018).

Organizational learning is a dynamic multi-level process that takes place on individual, group, and organizational level. It has feed-forward processes (connected to exploration) to transfer new learning from individual to group and organizational level, and feedback processes (connected to exploitation) to transfer what has already been learnt from organizational to group and individual level (Crossan et al., 1999). Thus, to create a learning organization, structures for enabling such learning processes need to be in place, combined with a supporting and motivating learning environment (Watkins & Marsick, 2019).

To meet new demands on production personnel, achieve organizational learning, and strive towards becoming a learning organization, it is therefore important to include structures for learning and motivation in the work design.

2.2.1 Motivation and individual needs

It is well-established that employee motivation has a significant impact on organizational performance (Deci et al., 2017). In workplaces where employees' individual needs (also called basic psychological needs) for autonomy, competence, and relatedness are satisfied, through a need supportive environment, they will be more likely to have higher levels of autonomous motivation. As shown by research within Self-Determination Theory (SDT), autonomous motivation will in turn lead to positive work behavior such as higher performance and higher well-being among employees (Deci et al., 2017).

Autonomy is the need for being able to act in accordance with one's own interests and values. It is not the same as having absolute freedom or independence, but being able to self-organize your actions rather than feeling controlled or pressured (Deci & Ryan, 2000). Competence is the need to feel able and effective at what you do, and is undermined by too difficult tasks, negative feedback, or criticism (Ryan & Deci, 2017). Competence is a sense of growth and flourishing. When the need for competence is met, people feel capable to explore and extend their skills (Van den Broeck et al., 2016). Relatedness is the need to feel connected to others, to cohere with a group and share values (Deci & Ryan, 2000). When people experience relatedness, they feel like they care about and are cared about by others.

The job characteristics and work design influence whether the work context will be need supportive or need thwarting. Deci et al. (2017) discuss how they agree with Hackman and Oldham (1976) in that autonomy, feedback, and task identity are important aspects, but view them as supports for individual needs rather than directly connected to motivation. De Cooman et al. (2013) could also show how job demands (such as work pressure) and resources (such as skill utilization) were connected to levels of need satisfaction and in turn both autonomous motivation and work effort. To meet increasing demands for learning and innovation in production, these factors should be considered. Using work design theory in combination with SDT therefore has the potential to increase understanding of how the production context influences behavior, and how this relates to outcomes such as performance and well-being.

2.3 Work design

The work design field studies how to organize work. 'Work design' is here understood as a broader term that includes both how jobs are organized and

activities that shape and redesign jobs (Parker et al., 2017), while 'job design' is the formal content and organization of jobs. Thus, work design includes not only formal job design as imposed by the employer, but also practices that employees use to shape their work (Parker, 2014). Since work design research originally sprung from a response to demotivating jobs after the industrial revolution, it has taken a special interest in how to design work for motivation, but also how to support individual development and health while still providing the needed efficiency for the organization by balancing control and flexibility simultaneously (Parker, 2014).

In their influential article, Humphrey et al. (2007) review and expand the work design literature and integrate this into a work design model, which is now commonly used. It builds on the job characteristics model (JCM) presented by Hackman and Oldham (1976) combined with further research within job design/work design. More recent contributions include additional factors related to tasks, but the main addition is within social characteristics. In the related work design questionnaire, the authors include task characteristics, knowledge characteristics, social characteristics, and work context to understand and measure work design (Morgeson & Humphrey, 2006). Another well-used perspective within work design is the Job Demands-Resources model (JD-R), building on the demand-control model (DCM), where the focus is on the relationship between job characteristics and employee well-being. Job demands such as work pressure and emotional demands can impair well-being while job resources such as social support and autonomy can have positive effects (Bakker & Demerouti, 2007).

However, much of the research within the field has taken a top-down perspective, focusing mainly on how the organization should go about designing jobs. To better understand the bottom-up perspective of employees shaping and

redesigning their own jobs, the sub-field of job crafting research has taken an interest in such individual practices of employees.

2.3.1 Job crafting

Job crafting involves individuals actively reshaping their work, differing from the traditional perception of employees as passive job performers (Tims & Bakker, 2010). Wrzesniewski and Dutton (2001) classify job crafting practices into task, cognitive, and relational crafting, where employees adapt their roles to meet individual needs. However, these adaptations can yield both positive and negative effects on organizations.

The antecedents of job crafting are individual needs, with the employee taking action to make the job better meet these needs. According to Wrzesniewski and Dutton (2001) these three needs are the need for control over job and work meaning, the need for positive self-image, and the need for human connection with others. Crafting the job is a proactive behaviour to initiate change (Tims & Bakker, 2010). Autonomy and flexibility enhance job crafting possibilities, while contextual factors like task interdependency and close monitoring can limit them (Wrzesniewski & Dutton, 2001). The type of role that the individual has can enhance or limit job crafting possibilities. For example, Berg et al. (2010) showed that higher-ranked and lower-ranked employees had differences in perceived opportunity to craft their jobs, with managers struggling to balance job crafting with other goals whereas lower-ranked employees had less such psychological constraints.

There have been attempts to synthesize the two dominant perspectives of job crafting, the original job crafting perspective presented by Wrzesniewski and Dutton (2001) and the job demand-resources perspective presented by Tims and

Bakker (2010). Bruning and Campion (2018) developed a role-resource approach-avoidance taxonomy, while Zhang and Parker (2019) proposed a three-level hierarchical structure, with approach-avoidance, behavioral-cognitive, and demands-resources crafting. However, there is still a lack of consensus and an ongoing debate on how to conceptualize and categorize different crafting behaviours.

Although not explicit in the original job crafting model (Wrzesniewski & Dutton, 2001) most research has framed job crafting as a proactive behaviour (Berg et al., 2010; Niessen et al., 2016; Tims & Bakker, 2010). Avoidance crafting, though, has been discussed as less proactive and having less positive outcomes than approach crafting (Bruning & Campion, 2018; Zhang & Parker, 2019) and thereby contested as a job crafting practice. In the original definition, however, there is no mentioning of how proactive job crafting practices should be: *"We define job crafting as the physical and cognitive changes individuals make in the task or relational boundaries of their work."* (Wrzesniewski & Dutton, 2001, p. 179). Thus, there is an ongoing discussion on which practices that can be characterized as crafting and how proactive these need to be.

Crafting is a bottom-up perspective on job design, where employees are active agents in shaping their work boundaries (Wrzesniewski & Dutton, 2001). As such, it puts the responsibility for meaningful and fulfilling work on the individual rather than on structural job design as formed by the organization. However, if jobs are poorly designed, crafting might not fully be able to compensate for such deficits (De Bloom et al., 2020).

2.4 Summary

In this thesis, I understand contemporary production needs through the demand for more innovative and motivated production personnel, facilitated by organizational learning and meeting individual needs connected to motivation. This in turn relates to a need for better work design in production, both from a top-down structural perspective and from a bottom-up job crafting perspective. The aim of the thesis is to explore the balancing between top-down job design and bottom-up job crafting in the context of operational jobs in production. This theoretical framework combines an understanding of organizational learning and motivation with work design and job crafting theory to explore this balance.

3. Research methodology

In this chapter, I present the research project that most of the research takes place in, and thereafter the methodology applied in each paper followed by a methodological reflection.

3.1 Research design and process

Most of the research in this thesis has been conducted within the research project "Leadership and organizational model for innovative, efficient, and socially sustainable production teams" (LOOP), financed by Vinnova within FFI (The Strategic vehicle research and innovation programme). In addition to this, another company outside of the research project was included in the interview study on job crafting (paper 1), since one of the project companies did not have front-line managers. The LOOP project runs through 2021 to 2024. The research project initially included four case companies, three of which were large companies in the automotive industry, and one was an SME in the turning and milling industry. After the first project phase one of the companies left the project due to losing their largest customer, leaving two larger companies and one SME as project participants for the remaining phases. Participating research partners in the project group are Chalmers University of Technology, University of Gothenburg, RISE, and KTH Royal Institute of Technology.

The action research project consists of three phases. The *pre-assessment phase* aimed at assessing the pre-intervention status of the case companies, and included data collection in the form of interviews, observations, surveys, and documents. In the *adaptation and implementation phase*, there was feedback from the first phase followed by training and workshops where the loop-model was adapted to each company as a part of the action research approach. After this, each company

started to implement the model in selected production teams. The next phase is the *follow-up and evaluation phase*, which will mirror the pre-assessment data collection to evaluate results of the intervention. Paper 1 uses data from the pre-assessment phase, while paper 2 uses data from both the pre-assessment and the adaptation and implementation phase, see figure 1.

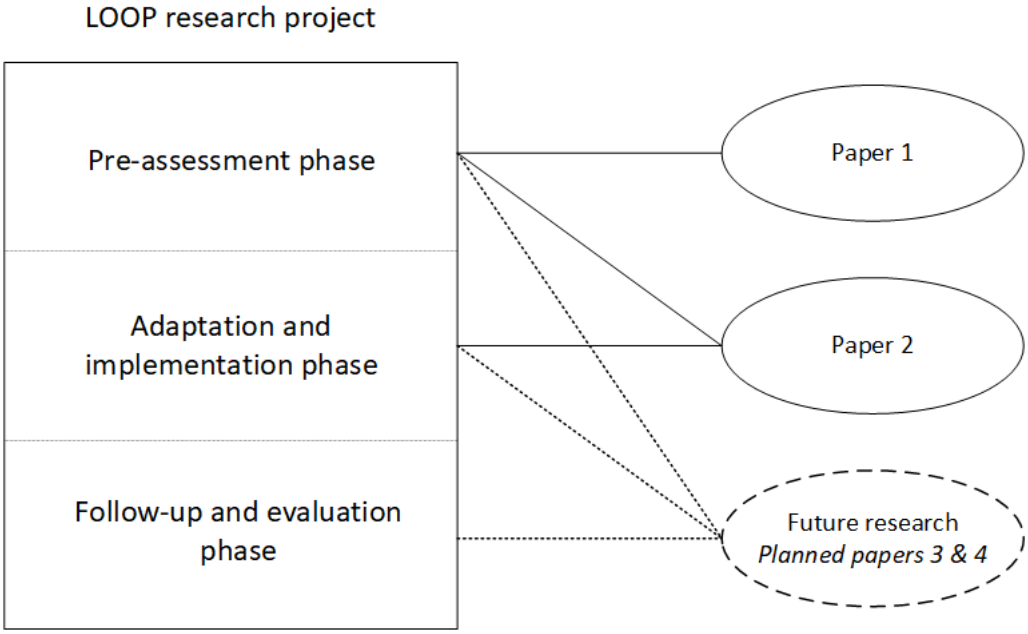

Figure 1. Overview of research project phases and papers.

Within this project the loop-model, which is presented in paper 2, is adapted and implemented in three participating companies. So far in the research project, the pre-assessment and adaptation of the model has been completed, the implementation and use of the model is ongoing, and an evaluation of its effects is planned for the coming year.

The research project is a multiple-case study with an action research approach, which is reflected in paper 2. As part of the pre-assessment, interviews and observations have been performed which are a basis for data collection in paper 1. The research project also includes a survey which will be used in coming papers in the PhD thesis.

3.1.1 Paper 1

Paper 1 is an interview study, complemented with observations and a focus group. Thus, this study utilizes part of the pre-assessment phase data from the project. Semi-structured in-depth interviews were chosen to find out how managers understood their work situation and what they chose to do to shape their work. Since we wanted to capture perceptions and attitudes that are not possible to observe, interviews were a suitable approach (Bell et al., 2019). In addition to 15 in-depth interviews with front-line managers, data collection consisted of interviews with 12 senior managers, observations of front-line managers, a focus group, and documents to get a better understanding of how the work situation was shaped by company context and senior management.

Interviews were recorded and transcribed verbatim, coded systematically using NVivo, and then analyzed using procedures of the Gioia methodology (Gioia et al., 2013). In a first order analysis, key concepts of respondents about their work situation, work design, and job crafting practices were captured. In a second order analysis, concepts were grouped into categories, generating 13 second order themes. In a third step, iterating with theory, five overarching dimensions and relationships were found, which then informed the model of job crafting.

3.1.2 Paper 2

In paper 2, an action research approach was applied to adapt and implement the proposed model, aimed at increasing learning and motivation in production teams through an improved continuous improvement (CI) infrastructure. This study used the pre-assessment phase and the adaptation and implementation phase data from the project. Since the aim was to generate knowledge by implementing organizational change through participatory research in response to

organizational problems, action research was found to be an appropriate approach (Coghlan, 2011; Coghlan & Shani, 2014). This entailed a cyclical process of participatory planning, acting, and evaluation in accordance with principles from Coughlan and Coghlan (2002).

The initial data gathering consisted of multiple data sources such as interviews, observation, shadowing, documents, a survey, and discussion meetings. After this, feedback sessions were held where data was discussed with representatives in the companies to lay ground for their adaptation of the loop-model. Three adaptation workshops, which also served the purpose of additional data collection, were held at each company. The implementation team in each company then participated in a loop leadership course, with both theoretical and practical content. After this, the companies started to implement the model, supported by follow-up meetings with researchers. Two joint workshops with all companies were held during the implementation phase to allow for learning across organizations.

3.2 Methodological reflection

The research project takes an action research approach to impose a change in work design in production. Action research is a valid methodology for research within operations management, aiming at improving organizations while deepening understanding and extending theory (Coughlan & Coghlan, 2002). It is an approach based on collaborative problem-solving between researchers and practitioners, to generate knowledge while also solving real problems (Coghlan, 2011). However, it is important to ensure rigor, reflectiveness, and relevance to achieve good quality in action research (Coghlan & Shani, 2014).

Aiming at solution-based inquiry, changing existing systems through designing them differently, this type of action research can be viewed within a design

science research framework (Romme, 2003). As such, it holds relevance for practice, aiming at providing a solution to a field problem, designing, and redesigning together with individuals in the organization (Van Aken, 2005).

However, there are also risks or downsides to having such a collaborative research approach. There is a risk of bias when researchers are participating in the studied change. In this project, we have taken the role of external facilitators, to help participants in case companies create and implement own solutions, described by Coughlan and Coghlan (2002) as a process consultation model to action research. Instead of being detached and neutral, an action researcher is immersed in the context and needs to stay reflexive (Coghlan, 2011). In this project, the group of researchers met continuously during the project to discuss findings in case companies. Since case companies were divided between the researchers, this allowed for reflection but also for comparison and learning between cases. The action research process needs to include multiple cycles of data gathering, feedback, implementation, evaluation, and reflection (Coghlan, 2011; Coughlan & Coghlan, 2002). Results from action research are contextual, but learnings need to be transferable (Coghlan & Shani, 2014) to generate actionable knowledge (Coghlan, 2011). Thus, it is important to generalize the learnings so they can be used to solve similar problems in other organizations, shaping them to be more humane, participative, and productive (Romme, 2003). Still, action research could be questioned as a research approach, as it is contextual.

In the interview study, parts of the pre-assessment phase data have been used. Interview data is suitable to get rich descriptions of perceptions and attitudes of respondents (Bell et al., 2019). Since their own view of their work situation was in focus in this paper, interviews were the most suitable method to choose. We did however complement the interviews with observations and a focus group to get a deeper understanding of their work situation and also triangulate to increase

validity (Patton, 2015). One issue that can otherwise be questioned is whether respondents give a right presentation of their work situation and behavior, or whether their accounts are colored by what they perceive to be the desired answer. This can naturally still be an issue but is somewhat mitigated by data triangulation.

The sampling of companies was a combination of convenience and purposive sampling (Eisenhardt & Graebner, 2007). Included case companies in the research project had to commit to a longitudinal intervention, which was made possible by a previously established contact between researchers and companies. Similarly, the additional company studied in paper 1 was also initiated through a previous contact. At the same time, the selection was not random but purposive, choosing case companies in the production industry that had competitive demands and a lean production transformation intention. Still, the sampling could be discussed and could perhaps have been further improved.

The methodology of appended papers in this thesis gives a preliminary picture of the balancing between top-down job design and bottom-up job crafting in production. Yet, there are many aspects which have not been covered here that could have provided additional understanding of the topic. The available time, resources, and cases were naturally limiting the insights and conclusions that can be drawn from research conducted this far. Using an action research approach has had the benefit of being able to adapt and implement new work design in practice. As such, it has been a fruitful methodology to explore the current situation and barriers for changing the work design in paper 2. As part of the pre-assessment, the action research study has also given access to interview opportunities and observations which have provided useful data for paper 1. However, the project boundaries have also put some constraints to which methods were available. The research project was approved by the Swedish Ethical Review Authority before data collection started, which is an ethical advantage but also limits possibilities

to collect additional data beyond what was planned from the start. For example, it would have been beneficial to gather more data about job crafting practices of operators and in production teams to extend the understanding further about the possibilities for job crafting. Also, the covid-19 pandemic limited the possibilities for in-person data collection, which meant that most interviews were instead conducted online via Teams or Zoom.

4. Summary of appended papers

Table 1. Overview of appended papers.

	Paper 1	Paper 2
Title	Designing work: Proactive and reactive job crafting practices of front-line managers in production.	Developing a structure for organizational learning through a people- and learning-centric continuous improvement model.
Status	Manuscript, to be submitted to an OM journal.	Under review in an OM journal.
Purpose	To examine how front-line managers in production are crafting their job to handle their work situation.	To increase the understanding of how a people- and learning-centric continuous improvement (CI) model can facilitate organizational learning (OL) and capability development.
Study object	Front-line managers in production	Operators in production teams
Research design	Interview study	Action research study
Main findings	Findings indicate that front-line managers perceived a dissonance between their job content and their prerequisites for doing the job and used job crafting practices to fulfil their individual needs and influence their work situation. Based on these findings a dynamic model of job crafting is presented depicting antecedents of reactive and proactive job crafting practices for mitigating the work situation temporarily or permanently.	The developed loop-model entails operators taking on specialist roles, participating in both production teams and specialist teams, aimed at increased learning and CI work in production. The model thereby provides a structure for OL, by supporting learning on individual, team, and organizational level. In addition, organizational challenges when adapting and implementing the model are identified.

Paper 1

Designing work: Proactive and reactive job crafting practices of front-line managers in production.

Paper 1 explores how front-line managers in production are crafting their job to handle their work situation. The work design of managers in production has largely been overlooked, although they have a key role in securing daily production as well as supporting and coaching production workers in daily tasks and long-term development.

Findings from this study indicate that front-line managers perceived a dissonance between their job content and their prerequisites for doing the job, leading to job crafting practices for fulfilling their individual needs, influencing their work situation. Based on these findings a dynamic model of job crafting is presented depicting antecedents of reactive and proactive job crafting practices for mitigating the work situation temporarily or permanently.

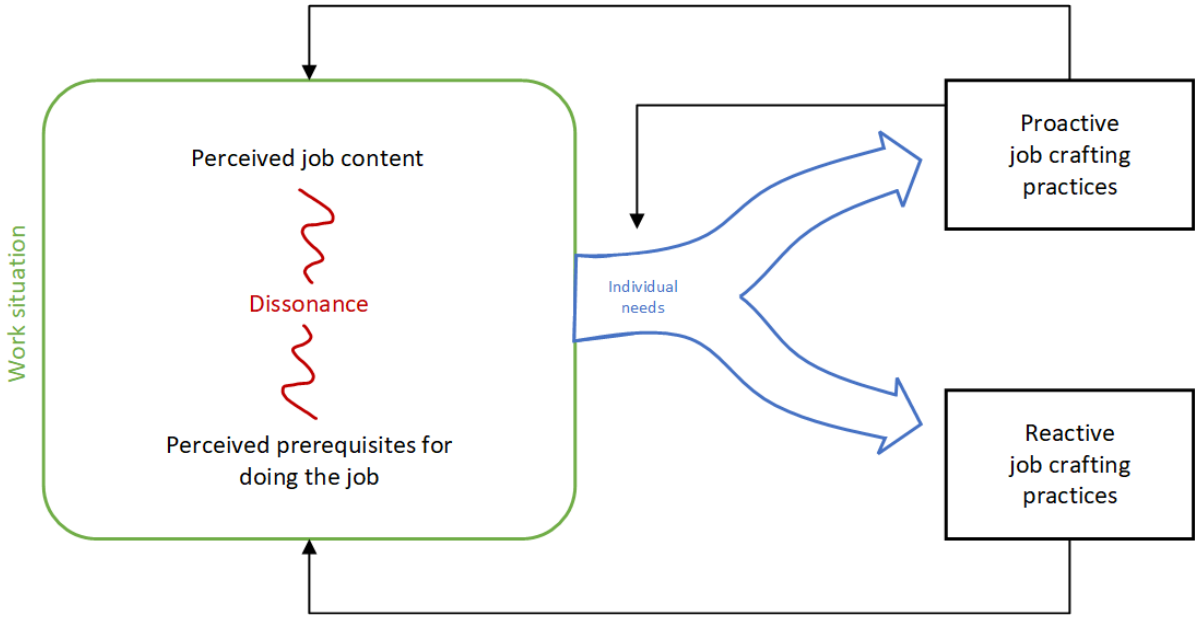

Figure 1. Proposed model of job crafting

The proposed model extends research on job crafting by providing a more comprehensive lens on the dynamics of work design. It shows how job crafting

practices are used by front-line managers to make their work situation sustainable by mitigating the mismatch between job content and prerequisites to do the job, thus contributing to previous research on behavioral operations acknowledging less rational and predictable behavioral work patterns.

For this thesis, paper 1 contributes an understanding of how vague job descriptions, role overload, and unclear boundaries lead to a work situation where both proactive and reactive job crafting practices are used as a coping behavior. In this study, it is shown that front-line managers in production have an unsustainable work situation in which they shape and redesign their work to be able to do the job and meet company goals. However, not all crafting practices used are equally positive for the individuals nor the organization. Findings from this study indicate that proactive job crafting practices are more beneficial than reactive practices. There seems to be a need to improve the work situation to reach a better balance between job design and job crafting practices.

Paper 2

Developing a structure for organizational learning through a people- and learning-centric continuous improvement model.

Paper 2 explores how a people- and learning-centric continuous improvement (CI) model (the loop-model) can be developed and adapted to context-specific needs in three different production companies. The model structures the work design for operators in production teams, to give them increased specialization and learning opportunities. While the main aim in the paper is to facilitate organizational learning and capability development, this work design intervention also affects the work situation for operators. Through a CI structure that combines specialist teams and productions teams for operators, organizational learning is enhanced through supported learning on individual, team, and organizational level. It also contributes to meeting individual needs through promoting competence development, increasing autonomy in production teams, and enhancing relatedness through closer team collaboration, thus contributing to enhanced motivation and well-being.

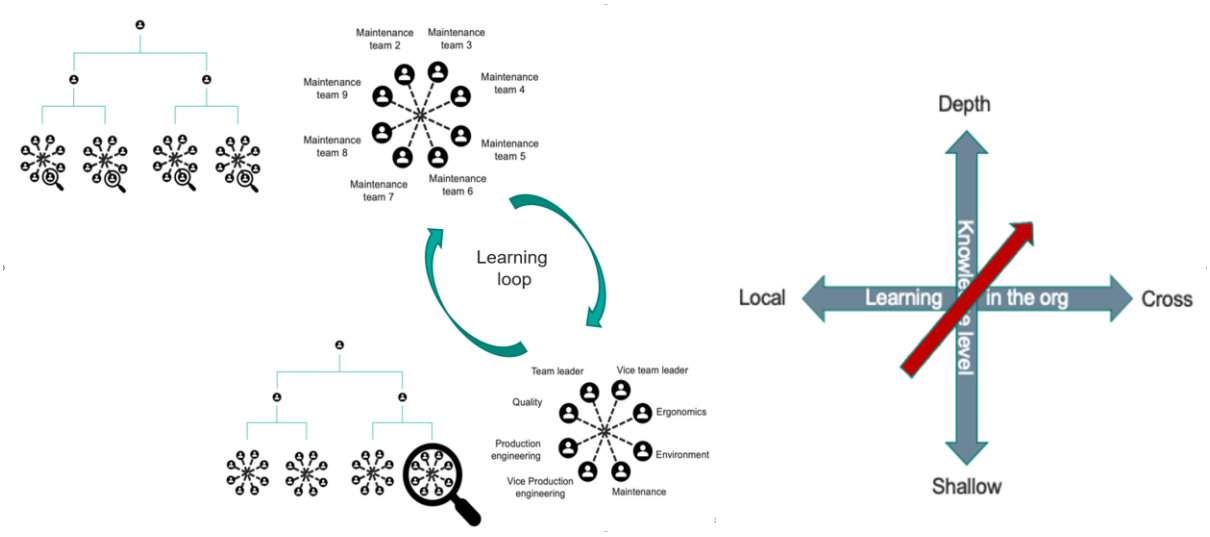

Figure 2. Proposed loop-model: the production team (below) and the specialist team (above), with a learning loop between teams leading to in-depth knowledge and increased organizational learning

The study also shows how a top-down work design intervention can be adapted and implemented in production, and the challenges that such an implementation can entail. The study is based on an action research approach where three production companies actively participate to introduce and adapt the loop-model. Operators take on specialist roles, participating in both production teams and specialist teams, aimed at increased learning and CI work in production. In addition, organizational challenges when adapting and implementing the model are identified. The loop-model could be helpful for organizations to advance their readiness for technological transitions, but then needs to be integrated and stepwise overtake the existing continuous improvement infrastructure. The proposed loop-model provides a structure for organizational learning in this context with particular focus on team learning level.

For this thesis, paper 2 contributes an understanding of how operator jobs in production tend to be very strict with little opportunity for operators to shape and redesign their own work. Thereby, autonomy and learning opportunities are limited in current production job design. While not specifically studying job crafting practices, it can be noted that opportunities for job crafting seemed to be scarce for this group.

5. Discussion

The aim of this thesis was to explore the balancing between top-down job design and bottom-up job crafting, in the context of operational level jobs in production. The two appended papers show work design from two different perspectives, with paper 1 looking at work situation and job crafting among front-line managers in production and paper 2 exploring a structured way of changing the work design for operators in production teams. By doing so, I want to contribute to the behavioral operations field, showing how work design choices can have less predictable consequences for behavior, learning, and motivation which affects outcomes such as performance, innovation, and well-being. Insights from this thesis thereby add to the ongoing discussion on how to increase learning and innovation to meet new demands on production personnel. Additionally, I contribute to work design theory by highlighting balancing issues between job design and job crafting, and by exploring job crafting in the production context which has seldom been in focus in previous research of job crafting.

5.1 Balancing control and flexibility

While both top-down job design and bottom-up job crafting can coexist, there are tensions between the two, not least when it comes to how strict job descriptions should be imposed from the employer, and how much opportunity and freedom an employee should have to job craft. The two appended papers show that the balancing is very different between front-line managers and operators. While front-line managers have vague job descriptions and vast opportunities for job crafting, operators instead have strict job descriptions and limited opportunities for job crafting.

Paper 1 shows that when work for front-line managers is not designed to meet their individual needs, they will job craft to shape and redesign their work. This is a spontaneous bottom-up approach used when job content and prerequisites for doing the job are not in alignment, creating a dissonance. This job crafting seems to be expected by senior managers, and it has potential to be a constructive and proactive practice. However, there are also potential downsides to job crafting for the organization since there are no guidelines on how to job craft nor any monitoring of its consequences. Reactive job crafting is potentially more problematic since it is a symptom of an unsustainable work situation and does not necessarily lead to desirable outcomes. For example, managers in our study used reactive practices such as working outside of office ours to fulfil tasks and connect with their employees on other shifts, they shortened their interactions with personnel to be very brief, they prioritized and postponed tasks, and they also altered their view of possible ambitions for the job. Such reactive job crafting practices may be detrimental to motivation, performance, and well-being since they do not fulfil individual needs. On the other hand, they also used proactive job crafting practices such as attending to relationships with colleagues, delegating tasks to subordinates, and framing personnel support as a basis for reaching goals. These proactive practices seemed to better fulfil individual needs, while also contributing more to production goals.

Paper 2 shows a structured way of redesigning work in production teams to better meet individual needs, learning, and motivation. However, there are challenges associated with adapting and implementing such a model which need to be overcome to be able to change work design. As such, the paper highlights opportunities and challenges with changing work design in production using a top-down approach. At the same time, findings from this study indicate that operators in production teams, especially before this work design intervention, had very limited opportunities to shape and craft their jobs. Their imposed job

design was generally very strict, having designated time sensitive tasks to perform throughout the workdays with little room for learning, development, or involvement in improvement work.

When designing work, there are potential tensions between control and flexibility, where outcomes such as efficiency and innovation are competing. Standardization can enhance efficiency, while autonomy gives room for flexibility and adaptability (Parker, 2014). Achieving simultaneous control and flexibility by finding a balance between top-down job design and bottom-up job crafting is a challenging task but holds the potential for combining increased performance and competitiveness for the organization with sustainable work conditions for the individual.

5.2 Balancing responsibilities

Job crafting theory puts a focus on proactive and agentic behaviors that employees use to improve their work experience (Wrzesniewski et al., 2013). By using such practices, each individual has the chance to shape their own job in accordance with their needs. Needs discrepancy (the discrepancy between what the environment offers and what the individual feels a need for) is a form of mismatch between the actual job and the ideal job, and provides motives for job crafting (De Bloom et al., 2020). This gives agency for the individual employee who chooses to craft to meet their needs. While such agency can lead to a positive self-image and work experience (Niessen et al., 2016), it can potentially also be overwhelming if needs discrepancy is too extensive.

A relevant question is whose responsibility it is to create a sustainable work design and work situation. When focusing on a crafting perspective, the responsibility for shaping and redesigning the work is put on the individual. It is

then each individual that can create a more sustainable work situation which meets their individual needs, regardless of whether this is supported by the employer or not. From the other perspective, an employer can be seen as fully responsible for creating sustainable work for all employees in the organization. If that responsibility is shifted, it could possibly mean that employers ignore when work design needs to be improved, instead supposing that individual employees will work it out themselves.

While it might be argued that employers would not choose to do so, we could see indications in paper 1 that front-line managers were actually expected to shape work themselves. Examples raised by senior managers were prioritizing, seeking support, and creating a structure for work. Work tasks had been added without other tasks being removed, which resulted in work overload. While not framed exactly like that, it seemed to be evident both to senior and front-line managers that work boundaries were vague and needed to be molded by the individual manager.

In paper 2 on the other hand, it was evident that existent job design was very structured for operators, leaving little room for autonomy or learning. As such, work for production personnel seemed to lack in meeting individual needs for competence and autonomy, without providing the opportunity for job crafting to better meet those needs. These two examples show both too high expectations to shape and craft the job for front-line managers, and too little possibilities to do so for operators. It may well be that such extremes should be avoided, instead finding a job design which is inherently need supporting but also gives room for job crafting.

5.3 Proactive and reactive job crafting practices

Job crafting is predominantly a proactive behavior, aiming at improving the job and shaping it to better meet individual needs (Niessen et al., 2016; Tims & Bakker, 2010; Wrzesniewski & Dutton, 2001). Through proactive practices, individuals shape their jobs to be more fulfilling. In addition to this, we find in paper 1 that there are also reactive job crafting practices, which do shape the work design but not as proactively and with less beneficial outcomes. An important finding here is that the work situation needs to reach a certain level to allow for proactive job crafting practices, that is to have a clear enough job description and a sustainable workload. It can be argued that reactive job crafting practices should be defined as coping behaviors rather than crafting (e.g. Palm and Eriksson (2018) shows examples of this division). Another way of viewing coping in this context is to regard job crafting as a type of coping behavior (Buonocore et al., 2023; Hernaus et al., 2023; Hornung, 2019; van Hooff & van Hooft, 2023). In this thesis I align with the latter, seeing job crafting as a type of coping (although there can be other coping responses as well). Regardless of the division between the two, it seems obvious that reactive practices lead to less favorable results as compared to proactive practices. Considering this, it is important to provide means for proactive practices to become more abundant than reactive practices. Findings in paper 1 point to the importance of a clear enough job design (including a reasonable workload) to reach this result.

5.4 Balancing individual and organizational outcomes

Also, the possibility to reach company goals and visions is dependent on how work is carried out. Thus, the organization has reasons to resist job crafting practices which are not in alignment with those goals, which may motivate

limiting autonomy and opportunities to do so. Naturally, this may differ between roles. Berg et al. (2010) found that higher-rank employees (such as managers) felt obligated to focus their job crafting efforts on meeting organizational goals, while this was not as evident for lower-rank employees. However, this may also be related to the opportunities or constraints for job crafting, where lower-rank employees' work is more bounded and thus can be perceived as fulfilling obligations regardless of job crafting. In paper 1, we could observe a similar attitude from managers, that they directed their job crafting towards meeting organizational goals. This was more evident for proactive job crafting, although some reactive job crafting also aimed towards this. Managers have a clearer responsibility for end goals, connected to their role, and thus it might not be very surprising that they include this responsibility in job crafting practices as well. However, some clearer guidance, job descriptions, and boundaries could help direct their crafting efforts to align even more with company goals. On the other hand, when opening up more for job crafting practices for lower-rank employees it could be beneficial to also address responsibilities for end goals. One example of this is the specialist roles for operators described in paper 2, where each operator has a responsibility for a dedicated area (such as quality or maintenance) in their production team. This may help direct their job crafting practices towards company goals. Having co-created job descriptions and allowing for bottom-up job crafting practices, rather than imposing top-down job descriptions, would provide greater development, growth, and self-reliance, consistent with calls for more people-centric practices in lean production (Hines et al., 2022).

New demands in production for innovative and adaptive behaviors requires increased organizational learning (Hines et al., 2022; Kristensen et al., 2022; Saabye et al., 2022). An improved work design and organizational structures for learning are therefore necessary to meet future demands, so that operators will be involved in finding new solutions (Kaasinen et al., 2020) and in continuous

improvement (Beraldin et al., 2022). While organizational structures are mainly a top-down concern, work design has both a top-down and a bottom-up perspective. Not least when operators are to be empowered, motivated, and agentic (Hines et al., 2022; Kaasinen et al., 2020), bottom-up work design practices need to be enabled. Thus, it is important to find and achieve a suitable balance between the top-down job design and bottom-up job crafting in operational level jobs in production.

6. Managerial implications and future research

6.1 Managerial implications

The practical contribution is to provide an understanding of how the work design and work situation affects front-line managers and operators in production, and the potential consequences that a too vague or too strict job description can lead to. An improved work design can aid in meeting increased demands for learning and motivation, leading to enhanced innovation and adaptability in the production industry. Findings indicate that front-line managers had vague job descriptions and an unsustainable workload, partly due to an expanding role when new production models were introduced. Operators on the other hand had strict job descriptions with limited learning opportunities or room for crafting, performing mainly standardized work tasks. Thus, the balance between top-down job design and bottom-up job crafting in these roles seems to be less than optimal. Work design in production should provide room for job crafting to meet individual needs, but also provide clear guidelines and a reasonable workload to avoid reactive job crafting practices which may be unsustainable for the organization and the individual. A possible starting point for improvement is to clarify job descriptions and responsibilities for front-line managers, and to include non-standardized tasks such as improvement work or specialist roles for operators.

6.2 Future research

In this thesis, I have explored work design through top-down job design and bottom-up job crafting in production, using studies of front-line managers and operators in production teams. These studies give preliminary insights into work design in a production context, but much still remains to be explored.

One topic that needs further exploration is how work design characteristics influence individual need satisfaction in this context. This can be studied using a quantitative or mixed-method approach to find whether (and which) work design characteristics can aid in fulfilling individual needs.

Another future research topic is following up on the results of the implementation of the loop-model as a new production work design. Does a work design intervention like this increase learning and motivation, and lead to enhanced performance and innovative behavior? Is it feasible to apply this type of model in a contemporary production context aiming at lean transformation?

Both these inquiries are planned to be studied in the continuation of the LOOP research project.

In addition, changes in job design for front-line managers could be proposed and implemented, such as setting clearer boundaries and clarifying vague job descriptions while also making sure that the workload is reasonable, to see whether this would lead to more proactive rather than reactive job crafting practices. It would also be fruitful to study job crafting practices of operators in production teams, to better understand how they perceive their job crafting opportunities given their stricter job design as compared to managers. Studying these work design aspects further would provide a broader understanding of the balance between top-down job design and bottom-up job crafting in production.

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