The impact of digital transformation on line managers' work

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Abstract
This study explores the impact of new digital technologies on line managers in the context of Industry4.0. The conference paper aims to analyze how the tasks and position of line managers have changed due to the implementation of digital technology and organizational restructuring. The research is conducted through case studies in 21 organizations, using qualitative methods such as interviews, document analysis, and ethnographic observation.
Preliminary findings from three cases indicate that line managers' tasks have undergone significant changes. The technology has automated or simplified monitoring and coordination tasks, relieving line managers of these responsibilities. As a result, line managers can dedicate more time to employee guidance and support, as well as strategically oriented tasks such as responding to flexible production requests, quality control, and stock management.
Organizational changes often accompany the implementation of new technology. The study identifies two paths of change: (1) organizational change driving the need for technological innovation to optimize work processes, and (2) technological innovation driving the need for organizational change. The nature and extent of organizational changes vary, with some cases experiencing only minor changes in team dynamics, while others undergo drastic changes in functions and employee profiles. Despite these changes, the formal position of line managers remains intact, with a continued need for their coordination and oversight role. However, the content of their job has evolved, requiring a certain level of familiarity with technology.
In conclusion, this study provides insights into how new digital technologies have influenced the tasks and position of line managers in the context of Industry4.0. The preliminary findings suggest a shift in the responsibilities of line managers, with automation and restructuring enabling them to focus on employee support and strategic tasks. The study also highlights the importance of organizational changes and the need for line managers to have a basic understanding of technology. Further analysis of the data will provide a more comprehensive understanding of the impact of digital technology on line managers in diverse organizational settings.

Keywords
Digital transformation, line managers, job design, organisational design

Conference paper

Context

Do you remember the last time you were astonished about something? Chances are that technology played some role there. Technological innovations continuously revolutionise our way of living and working. Recently, the COVID-19 pandemic worldwide has accelerated the ongoing process of digitalisation and the use of information and communication technologies (Fichman, 2023). But there is more. We are also faced with so-called Industry4.0 technology, a concept that refers to technology combining the mechanical automation of actions with information technology (Vereycken et al., 2020). Digitalisation and Industry4.0 are seen in the emergence and growth of new forms of work such as in the platform economy, but equally impact organisations in the traditional labour market.
Organisations worldwide are recognised to exist in a VUCA environment: a volatile, uncertain, complex and ambiguous context that challenges them to stay afloat. Continuous technological

innovations are an important driver of this ever-changing environment. Because new technology comes with both opportunities and challenges. When looking at the impact of technological innovation on employment sustainability, an ambivalence is found between the enhancement and the deterioration of jobs. On the one hand, new technology allows jobs to be more sustainable, for example when an exoskeleton provides support or replacement for physically demanding tasks (Eurofound, 2019). On the other hand, it may also decrease the quality of employment, for example when augmented reality glasses cause increased strain on the eyes (Marklin et al., 2022). Sometimes, the same technological tool even leads to different outcomes (Schoose et al., 2023). Empirical analyses confirm that technologies affect subelements of the broad concept of employment sustainability both positively and negatively. Moreover, these separate effects on subelements of employment sustainability are expected to be amplified because different types of tasks tend to systematically bundle together (Fernández-Macías et al., 2016; Fernández-Macías & Bisello, 2020). Intellectual and social tasks are often combined, while physical demands often co-occur with routine tasks and the use of machines. This implies that certain jobs and sectors currently deal with an major impact of the increased use of technologies, whereas other are rather untouched. The fact that new technologies are unevenly spread over jobs and sectors leads to an increased difference in job quality and job polarisation (Peña-Cases et al., 2018). This is seen on a labour market level, but also within organisations.

However, most research recognises that the actual impact of digital technologies depends on the context in which these innovations are applied and how they are used. The role of line managers and HRM practises seems crucial. Line managers are traditionally not part of the top decision making, nor are they at the executing end of the chain. In many organisations, line managers are part of the middle management and seen as a crucial link between the top and the work floor, since they are asked to translate the formal organisational policies into daily practices. They carry the daily responsibility for the work environment in their group. Line managers are known to have an important impact on the well-being of their employees. Simultaneously, they are held accountable with regard to the success of the implementation and to provide positive results (Hasson et al., 2014). Especially when implementing new digital technologies, companies step out of their comfort zone. Together with changing the general architecture of an organisation's structure, Veile et al. (2019) emphasize the need for a systematic cultural change addressing the new organisational reality. According to the literature, this cultural change would ideally be initiated by the management (top-down approach) and implemented incrementally – which is where line managers play a major role. Line managers are then seen as positive role models for well-being, and responsible for building motivation and engagement (Blanco-Oliver et al., 2018). In this work, the following definition is used for line managers: "managers who have first-line responsibility for a work group. They are accountable to a higher level of management and are placed in the lower layers of the management hierarchy, normally at the first level" (Hutchinson & Purcell, 2008).

Objectives

Despite the determining role line managers take up with regard to the success of managerial decisions and the well-being of the employees, it remains unclear how they are impacted by the implementation of new digital technologies in the context of Industry4.0. To understand this, this paper highlights two aspects of line managers' jobs that are likely to change due to the use of new, digital technology: **their tasks and their position within the organisation**.

Our first objective is to analyse how the tasks line managers face have changed since using new, digital technology. For an organisation to deliver any type of output, there are different tasks that jointly contribute to this output. Van Hootegem et al. (2014) distinguish four types of tasks:

executing tasks, preparatory tasks, supportive tasks, and regulatory tasks. Applying the framework of Van Hootegem et al. (2014) to the specific situation of line managers provides guidance in the classification of tasks. This objective focuses on the type of tasks that have been added or removed from their responsibility, and understanding the mechanisms that cause this change. More specifically, we will analyse how the type and application of technology in combination with organisational characteristics plays a role in the changing tasks of line managers. As described above, changing tasks because of the use of technology can have a positive or negative effect on the sustainability of work.
Understanding the changed tasks of the line manager also lays the groundwork for the second objective. It is likely that the type of tasks for which a line manager is responsible links to the organisational structure. The second objective thus is to analyse how the position of the line manager within the organisation has changed. This implies a study of changing organisational design and changes in power and expectations.

Methods
Data collection is organised through case studies, based on a combination of qualitative methods: semi-structured in-depth interviews, discourse analysis of documents and ethnographic observation methods of the organisation. Given that the digitisation of economic sectors is progressing at different rates, starting points, specific needs and technological preference, we have selected 21 organisations to cover a wide variety of sectors and company sizes, covering the three regions in Belgium. We also aim to look at different models of management, therefore platform organisations were included. The presence of broadly implemented digital technologies was an important case criterion in the selection. For companies with multiple branches, the branch that was considered as case needed to have autonomy and freedom in decision making for the selection and implementation of the technology. For the sake of comparability, we excluded self-employed and very small companies with less than 10 employees.
Within these organisations, the most relevant interviewees were selected: interviewees needed to be affected by the new technology to perform their daily tasks, and they needed to have seniority within the organisation to be able to compare changes in work and work design before and after the new technology.
The analysis had a mainly deductive, theory-based design, in which a conceptual model and a set of variables were conceived as tools for guiding the data collection, analytically categorising the data, identifying regularities and ensuring comparability between the various cases. For this, the theoretical model was operationalized into a conceptual model, which also served as a guideline to create the interview topic list and the coding tree. Nevertheless, inductive elements were not neglected as data collection and analysis were considered iterative steps. In other words: during the analysis, attention was given to both the story behind the variable values and the actual value of the variables. Moreover, when data was collected and analysed, the initial conceptual model could be refined during the analysis, until a point of data saturation was reached. The technique of pattern-matching was used to compare the empirical patterns with those predicted by the propositions. Pattern-matching allows to identify the coincidence of different elements to see which influences play the most important role in which situations, for example depending on the company size, organizational structure or the type of technology.

Main results
Currently, the fieldwork is finalised and the analysis is ongoing. The first preliminary findings below are rather descriptive and are based on the coding and understanding of the three cases that were coded first (numbers 02, 03 and 05). An in-dept cross-case analysis is being prepared.

The three cases used here vary in size, type of technology, organisational model and Belgian region. Thereby, they are an interesting starting point. Nevertheless, they are a selection from the available data and don't claim to be representative for the complete dataset.
There seem to be clear changes in the tasks to which line managers can dedicate their time. In all three cases, monitoring and coordination tasks were facilitated or even made redundant because the technology holds information about the production process that is either generated automatically or inputted by the employees. Traditionally, many line managers collected and generated this data for the creation of company reports. Since the technology automatically holds this information and this information is considered as "The Truth", line managers are no longer responsible or in charge of this well-defined and time-consuming task. The time gained is said to be spend in two ways: first by investing more in employee guidance and support, and second by fulfilling new tasks that are more strategically oriented. This includes for example more adequately responding to flexible production requests, quality control and stock management.

> "Surely that [our job content] is still broad. It includes being a listening ear for our people, so on a social level if they have problems that they can come to us. To in fact planning for our people that they know what to do. … There is also a piece of administration that we have to do, printing the order, going to see if the goods are already here, the aftercare of orders, the leftovers that then go to the warehouse, that's batch-driven here so we have to see that all the pieces that go to the warehouse have a batch to move back there. So yes, the job is quite broad." (line manager, case 03, translated from Dutch)

> "It used to be that there always had to be someone around that knew a lot about this, and now it is not really necessary. You do have to keep an eye on the workers. But I mean, after an hour, they can move on. You can organise that more easily." (line manager, case 05, translated from Dutch)

In the three cases, line managers are not expected to be a technical expert with regard to the new technology. Often, a separate position is created of someone who is in close collaboration with an IT department and who is meant to bridge between technical specifications and actual use. In case of problems with the new technology, people are referred to the person in this new separate function. This is similar to a change manager, but in most companies this is related to a specific project and this person remains available after the implementation phase and thus also plays a role in the new way of working, the new status-quo. Another seen option is that this technical expertise lays with a team member who takes up this responsibility as an additional role. Companies where the implementation is successful stress that it is important that, either way, the person who is asked to be available for questions and guidance of colleagues to facilitate the use of the technology, has sufficient time that can be dedicated to this task and that it should never be something that comes on top of the other work. Nevertheless, this is also mentioned to be the most tricky part since companies often already have difficulties to find sufficient employees and agendas are packed.
According to the task typology of Van Hootegem (2014), line managers were never involved in executing tasks but rather performed a combination of preparatory tasks, supportive tasks, and regulatory tasks. After the implementation of new technology the same type of tasks are performed, but the content of the tasks changed.

> "Because the ERP was implemented along with that exercise of self-managing teams, there are tasks that used to be done by a line manager but are now done by employees, so

> the line manager had to take up other tasks that are more towards planning, organising, bringing structure. The people who had once started here as line managers had also not signed up for that, the job content was different so that has had a very big impact." (CEO, case 03, translated from Dutch)

In several companies, the implementation of new technology is accompanied by an organisational redesign.

> "So many things have changed. One change has accelerated another change, it's exponential that it goes, you feel that too." (case 03, CEO, translated from Dutch)

Both processes can be quite disruptive for the organisation and require considerate attention. The three cases acknowledge this and made sure the periods of disruptive change caused by technology or reorganisation did not happen simultaneously. Based on the three cases, we expect that different paths can be distinguished.
First, organisational change causes a need/potential for technological innovation to optimise the working processes. In our cases, we saw this was caused by organisational growth or by changes at the managerial top. In these situations, the organisational change was limited to the working of teams and did not consist of a complete organisational redesign. The production process was not changed drastically and the implemented technology was used to support the daily tasks of employees. In this path, the profiles of employees working in the organisation did not change drastically, mostly a 'willingness or interest' to work with technology sufficed.

> "That is very important though, that that is not the intention. That is absolutely not possible. That someone then, if it is very clear we need this tool and we use it in our daily work certainly towards our user, then we can't just say 'well, I'm not really that interested and don't want to use the tool'. It will definitely be looked at [in evaluations]." (case 02, employee, translated from Dutch)

Second, technological innovation causes a need/potential for organisational change. In our cases, we saw that technological innovation in this situation is very much management-driven, figuring out the organisational part later in the process. This also implies that in this situation the organisational change was more drastic and required the creation of new functions and new employee profiles. Technology was used to replace tasks and significantly change the production process.

> "Before, that was all determined by the person who was producing all that. Now, we have a digital platform that prepares [the orders] and the production people don't have to worry about it anymore because it's all predetermined." (case 05, CEO, translated from Dutch)

> "Employees used to do everything from A to Z, starting with drilling a hole, laying wire, to finishing. Whereas now everything is fragmented into pieces and everyone does a piece. With that, the threshold to enter here as an employee is also very low." (case 05, CEO, translated from Dutch)

In general, the formal position of line managers seems to be safe. Operating under different job titles, the position of a line manager still exists in all three cases. Even when teams are created, there is still a line manager to coordinate these teams.

> "Of course, you have to give people authority in their work and let them take on more responsibilities but you still have to check their work in helicopter flight and see that all processes are running as they should." (case 03, CEO, translated from Dutch)

Nevertheless, the content of their job changes and even though they are not expected to be technical experts, some degree of 'feeling' with technology is requested more and more.

Discussion/perspectives

The described preliminary results are based on only three of the 21 cases in our study. We don't expect these cases to be representative for the complete data collection and we do anticipate different approaches and trajectories in the other cases. Especially in the cross-case analysis, we expect that there will be different roadmaps to similar situations, or similar roadmaps with different outcomes. Our aim is to describe these similarities and differences and find consistencies in a wide range of businesses.

Even though the companies in our dataset differ largely, they share one important characteristic, namely a successful implementation of new technology. This stems from a methodological choice to focus on organisations that have passed the turbulent implementation phase and study their new status-quo. We are aware that there is a lot to learn from failed implementations and we realise that this selection criteria might bias our measurement of the employment sustainability. Keeping this in mind, we aim to zoom in on the effects on employment sustainability of line managers in later stages of the research.

Follow-up research is also scheduled to focus on how changes within the job of line manager cause changes in how they approach the responsibility to guarantee sustainable employment for their employees. We therefore look at the changes in leadership of line managers after digital transformation. Leadership can be understood as "the set of activities by which a line manager influences the behaviour of his or her subordinates in order to achieve the organisation's objectives more effectively on purpose" (Bergeron, 1979, p. 24, translated from French). Therefore, it can be argued that when attempting to understand a context of working with new, digital technologies, it is useful to look at the leadership style of the line manager. In addition, Kazim (2019) showed that line managers are willing to change their leadership style when confronted with disruptive change and that they are more successful doing so 'once given a clear vision, commitment and support from executives'. Through interviews with line managers, we aim to understand how their leadership style has changed, and more specifically, which mechanisms directed these changes.

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