
4th Conference on Production Systems and Logistics

Digitalisation And Its Impact On Leadership Competences In Production Work

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Abstract

This contribution tackles the effects of digitalisation on leadership in production work. Based on the assumption that production work in the future will be characterised as more flexible, networked and digitalised, the digital transformation will lead to changes in business models, organisations and work design. Accordingly, changed and new competences are needed by executives. There is a new generation of executives who have to view business differently and use different sets of competences to lead employees. In this paper, an overview will be given about digital trends and their impact on leadership. Secondly, definitions of terms about leadership and the difference between traditional management and digital leadership will be illustrated. Furthermore, competence sets for leadership in digital transformation in production work will be outlined. These competence sets can be described both by several competences subsumed under the term “interactional competences” and by competences needed to establish a work design conducive to learning, facilitating and enabling competence development of employees. We think that these two competence bunches depict the core of future competences of executives in production.

Keywords

Digitalisation; Leadership; Competence management; Digital transformation; Interactional competences; Work design for learning

1. Digital trends and their impact on leadership

Nowadays, everything gets more dynamic, more volatile and changes at an enormous pace. The driving force of change for organisations can be found in three topics: globalization, society and digital transformation [1, 2].

Within the digital transformation as one of the major megatrends we are facing numerous technological and organisational challenges aligned with topics like data analytics, blockchain, virtual/augmented reality or artificial intelligence [3, 4, 5]. According to Barley [6], this will lead to fundamental changes in business models, organisations and work design. Today, many entrepreneurs still think digital transformation means switching to new information technologies or even just adopting social media to the business. However, digital transformation is much more far-reaching: what began in the 1970s with computers and emails now includes self-driving cars, smart refrigerators, human-machine interaction at the workplace and 3D printers that even print cars. Digitalisation impacts on all company functions: from research and development to production and marketing, human resources and administration. Impacts are thus created for the entire company, functions and projects as well as for each individual employee [7]. More and more companies are

establishing new structures and processes, new roles and responsibilities, new forms of cooperation, new leadership and motivation systems [8].

Accordingly, completely new demands are placed on leaders. The new requirements for leaders within the context of digitalisation fill long lists. Most importantly, they should be more agile, innovative and creative, think disruptively and tolerate mistakes, reduce their ego and instead take a moderating role for their employees [2, 4, 9, 10, 11, 12]. All in all, the new requirements are extensive, and they intervene deeply in the personality. This leads to the assumption, that digitalisation requires a new way of leading which comprises a broad range of requirements for executives - both in terms of breadth of skills required and depth.

Unfortunately, in the context of digital transformation and considering the role of leadership there is a huge need for solutions giving answers about how to enable leaders in organisations to cope with all these new demands. Furthermore, research on these topics is still low [13]. In the past, some research activities can be found in the following areas concentrating on different aspects: Impact on leadership of home office and teleworking concepts [14], leadership in virtual teams [15] as well as digital technologies and the potential to substitute employees and leaders [16]. Schwarzmüller et al. [17] concluded, that the research topics mentioned (amongst others) have a strong impact on leadership principles. So, the research on competences required for leaders in new digitalised work environments is of greater concern for many organisations [18, 19].

2. Evolution of digital leadership

Digitalisation, which is characterized by technologies that transform the analogue physical world into digital applications, is not just a technological challenge [11, 20]. It is currently initiating a cultural revolution that turns the classical understanding of leadership on its head. The new version is called digital leadership [4, 11, 21]). When talking about digital leadership, there are other synonymous terms in other countries, e.g. leadership 4.0 in Germany, referring to the term Industrie 4.0 [22, 23]. Besides that, digital leadership is also used to describe companies holding a lead position in the field of digitalisation, e.g. Google LLC. Digital leadership in the context of this paper refers to the leadership style needed to manage an increasingly digitalised world. It does not only mean to use digital media for communication and cooperation as a leader, but also to adapt the leadership behaviour to the demands of the new digital reality.

But what distinguishes digital leadership from traditional management and leadership and what are its unique features? The different concepts describe specific prototypes of executives' roles which arose in the context of different historical eras as a result of adapting to new challenges emerging from revolutionary changes in economy. Figure 1 shows their evolutionary development along the different eras, their main tasks and characteristics (own supplemented and modified representation according to [24]).

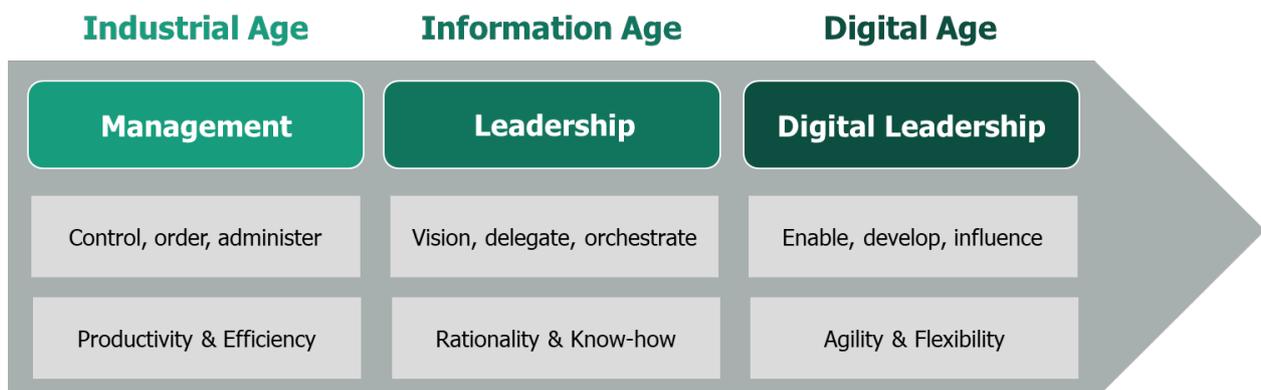


Figure 1: Evolution of digital leadership

Traditional management concepts mark the beginning and started to evolve during the industrial age characterised by mass customization. The critical factors to remain competitive within this context are productivity and efficiency. Decisions are made based on strict guidelines and processes (efficient decision making). Therefore, management tasks focus on controlling, ordering and administering promoting stability and continuity [2, 24, 25].

As a next evolutionary step, leadership concepts started to develop sparked by the new challenges that came along with the information age. This era was induced by the introduction of computer technology, followed by other information technologies such as internet connectivity. Easy access to information and directly sharing it with others was made possible enabling a more decentralized decision-making and autonomously working employees. Thus, in this context, the critical factor for competitiveness is the knowledge gained from analysing information. Consequently, leadership tasks focus on visioning, delegating and orchestrating aiming to create a working environment that offers more latitude to the employees in performing their actions, since guidance is provided by the accessible information, a shared vision and culture [2, 24, 25].

The digital age is, where we stand right now, and the evolution of digital leadership has just started [22]. As a reaction to the challenges of high levels of unpredictability and complexity when making decisions due to a fast-changing dynamic work environment shaped by digital transformation leadership has differentiated itself significantly from traditional management tasks. Basing decisions on knowledge and insights gained from data analysis is not enough anymore. Digital leaders need an agile mindset enabling them to adapt quickly to new requirements, to make decisions intuitively and by using their creativity, if this is required by the circumstances, but also to support their employees and the organisation to cope with changing requirements [9, 10, 24]. Therefore, the following tasks and corresponding competences are central for leaders to act successfully in a digitalised work environment:

- Enable digital change: Not only competences to use digital methods or social media are requested but also competences to be the driving force in change processes to cope with challenges caused by digitalisation (e.g. new business models and processes) [2, 10, 11, 25].
- Develop employees: Competences are needed to give employees a kind of corridor to develop a specific training and to speed up their individual development in coordination with the organisational targets. For these issues, a digital leader could be a coach, a „good practice”, and again, an enabler [2, 11, 22, 25]. Furthermore, competences are needed to early recognize if employees tend to get health problems by working (especially psychological problems) and to find options to overcome them or avoid them [2, 4, 26].
- Influence: Competences to inspire employees and encourage them to cope with challenges in work are important. This includes, that errors are a part of the development process and to inspire employees to learn for the benefit of their own employability as well as the organisational success [2, 27, 28].

3. Interactional competence

At the centre of the project “ella4.0 - Sociodigital transformation towards excellent leadership and labour” funded by the German Federal Ministry of Education and Research is the topic of interaction and the competence-related requirements that managers face in order to establish “good work” with employees via new channels, in a digital setting of processes and procedures and under constantly changing conditions.

The socio-technical system within organisations is increasingly becoming a socio-digital system. The entire interaction structure (People (M)-technology (T)-organisation (O)) is subjected to continuous, accelerating change. With the influence of digitalisation and the associated changes in the technical infrastructure in the company, the working methods are also changing, they are becoming more digital. At the latest when the global corona pandemic broke out, many companies increasingly used video and web conferencing tools

overnight [29]. The networked production systems in industry also enable remote maintenance from the computer at home and create a new form of long-distance collaboration that requires the development of competences on the part of managers. The effects impact the individual employees, teamwork and the managers in the company, who shall continue to pull the strings in a controlling and orchestrating manner.

Interaction denotes a reciprocal and related action between two or more people. Interactional competence is thus to be understood as the ability to express oneself appropriately and constructively in social relationships and situations, to act and to speak. Interactional competence aims at a behaviour-influencing design of the entire company-related (digitally supported) interaction space (MTO) in normative, strategic and operational terms. With the result informational, qualificational, motivational and infrastructural conditions should be created. In the exchange with various companies, this definition has turned out to be particularly appropriate for defining interaction competence and also for describing it from a practical or operational point of view.

Thomson et al. [30] show that the environment in companies and their requirements are changing. They evaluated the promotion criteria of employees in the company in a meta-study in their project report. These should be sorted by importance. Unsurprisingly, from the point of view of the followers, professional competence is in first place, but closely followed by personal competences, which are of similar importance. This indicates the change in the understanding of leadership, from professional experts to inspiring leadership.

The question of whether there is a change in the leadership role in the course of the digital transformation is also confirmed by almost 80 percent of respondents in the study by Hofmann et al. [31]. This does not mean, however, that the new management approaches are also reflected in the organisational structure of the company with regard to organisational charts, cooperation, incentive or evaluation systems. The field of tension between the old and the new comes to light again, in which the executives have to move and find their way.

Great importance is attached to one's own attitude towards change. As an absolute top issue, "openness to change" is confirmed as a currently very important competence of managers [32]. If personal responsibility for the current situation is still the same, the ability to change clearly dominates the list of additional questions about what will become increasingly important in the future, with over 90 percent agreement.

Although the importance of personal competences is slowly increasing, companies seem to be paying little attention to the targeted development of digital competences. Surprisingly, competences for the digitised workplace, which are important for "collaboration in virtual teams", "communication via digital media" or "handling data", are found in the lower ranks and will continue to be of little importance in the future allocated [32]. This picture can also be seen in Hofmann & Wienken [33], where it is still accompanied by a decline in the importance of area-specific expertise.

These digital competences have either not yet arrived in their importance for the future development of the company or do not (yet) play a role. In many companies, the topic of internal digital forms of cooperation has so far received little attention (Beyer 2015). Moreover, it is remarkable that research has not yet provided any significant findings here either, although internal cooperation between managers and employees is very important for the success of digitisation strategies. The mechanisms of action of the digital cooperation between managers and employees to be taken into account in this design field are still largely unknown.

One area of competence is "digital and media competences", which particularly emphasizes the important topic of communication in the digital setting.

"Analytical and planning competences" will also be important in order to be able to recognise, analyse and implement as a manager, for example, the needs of employees with regard to future development - here again the topic of basic digital competences for everyone. This can only succeed if, at the same time, "economic competences" are developed to such an extent that managers are able to recognize the potential and threats

from their environment for their company (in good time) and to initiate measures that will contribute in the long term to put the processes, working methods and the business model on a sustainable footing.

With the change in the leadership role, the changed need for leadership, which, as discussed above, is supplemented or replaced, new competence requirements located in the area of “leadership competences” are defined for executives. These competences as well have to be developed.

The last two points form the closely related personal competences of the manager, which are ultimately decisive for the managerial success, as well as the professional competence of the manager.

It thus becomes clear that interactional competence is not a specific, single competence, but rather consists of several specific competence bundles:

1. Digital & media competences
2. Analytical and planning competences
3. Economic competences
4. Leadership competences
5. Personal competences
6. Professional competences

The clustering of competences was based on the analysis of the above-mentioned literature. Furthermore, in the first year of the project, qualitative surveys on the topic of “Effects of digitalisation on leadership” were conducted with 19 participants, including entrepreneurs, consultants and experts from science. The results of the interviews were then analysed and evaluated using a uniform code book with the software MAXQDA.

From the results of the interviews the mentioned competence bundles can be presented in more detail as follows:

<p>Digital and media competences</p>	<ul style="list-style-type: none"> ▪ Communicate effectively, also across distances ▪ Digital competences ▪ Technological know-how/acquisition of new knowledge ▪ Understanding of data, privacy and processes ▪ Creative thinking ▪ Media literacy 	<p>Personal competences</p>	<ul style="list-style-type: none"> • Personal development of leadership style • Leadership at a distance • Ability to reflect (reflect on oneself critically and then make decisions) • Communication: <ul style="list-style-type: none"> ▪ Communication skills – and strength ▪ Appreciating people, encouraging communication ▪ Introduce and establish new, changed forms of communication ▪ Constitute an understanding of communication and explanation, the comparison of expectations and the conveying of strategies ▪ Ability to listen and understand the other person • Political skills (ability to place and enforce one's own needs in the right place) • Emotional Intelligence/Competence • Conflict resolution: <ul style="list-style-type: none"> ▪ Conflict Resolution Skills ▪ Ability to resolve conflicts • Motivation: <ul style="list-style-type: none"> ▪ Motivation and coordination of employees ▪ Methods for motivating employees ▪ Able to give constructive criticism as well as praise and appreciation • Being able to endure uncertainty (VUCA) Socio-emotional self-competence • Collaboration skills • Attitude between laissez faire and collaborative (relaxed and at eye level) • Willingness to change (flat hierarchies, etc.), also with regard to the innovative design of leadership • Collaboration across subject and organizational boundaries / networking / exchange • Support in the change process / navigation, provide more leadership in the sense of orientation • Confidence to go in a certain direction and having the necessary openness to do so • Willingness and ability to learn • Personal maturity • Reverse monitoring, accept leading of younger people • Systemic thinking
<p>Analytical and planning competences</p>	<ul style="list-style-type: none"> ▪ Good comprehension to fully comprehend/understand the situation at hand ▪ Problem-solving skills ▪ Further development of technologies in professional and activity fields ▪ Coordination 		
<p>Economic competences</p>	<ul style="list-style-type: none"> ▪ Strategic thinking ▪ Strategic competence with regard to changes in the working world ▪ Dealing with data and the question of what potential is associated with the data for the organisation 		
<p>Leadership competences</p>	<ul style="list-style-type: none"> ▪ Employees expect a counterpart at eye level ▪ Develop a framework in which people can display their strengths ▪ Health-promoting leadership ▪ Dealing with people, developing them, recognising their potential and dealing with the differences between employees (e.g. attitudes, skills). ▪ Coaching: respond to the potential, lead individually and take time ▪ Sensitivity of the manager and the ability to lead in a situational manner ▪ Decision-making skills and knowing how to enforce them 		
<p>Professional competences</p>	<ul style="list-style-type: none"> ▪ Basic understanding of process knowledge / professional knowledge ▪ Experiential knowledge about the respective processes, problems, framework conditions 		

Figure 2: Competences derived from the interviews, summarised as a model in areas of competence

From the point of view of company actors of our project, some competences from the above-mentioned bundle of competences are of particular importance. In the case of “digital and media competences”, for example, dealing with which medium is best suited for which specific situation turns out to be an essential competence. There is usually a large selection of different tools available, and it is important to keep track

of them. A good grasp of situations quickly and as completely as possible is emphasized by the companies with respect to “analytical and planning competences”. When it comes to “leadership competences”, it is dealing with people. Employees must be viewed as individuals whose potential must first be recognised so that they can then develop accordingly. With regard to “professional competences”, the professional knowledge and basic understanding of processes are particularly relevant. In terms of “personal competences”, companies identify several specific competences as particularly relevant, such as the personal development of leadership style, the ability to bear uncertainty, the socio-emotional self-competence and the willingness and ability to learn as a manager.

At first glance, the bare number of different “personal competences” that need to be developed seems surprising. Along with the change caused by digitalisation, the procedures, processes and tasks are changing at the structural level in the company. Project work is finding its way and is thus also changing the way in which people work together. If you look at leadership as interactional work, this development cannot remain without an impact on the way in which leadership is carried out, since leaders and those being led are in exchange:

Leadership is not replaced by digitalisation. This is also reflected in what is by far the most frequently mentioned ability of a manager to shape communication as an information hub and also to be the central point of contact in the team. At the organisational level, working in networks and projects that follow different rules, processes and methods is becoming more and more common. The ambidextrous structures lead to a “communication explosion”. All the more important in this context is and remains the manager with the task of ensuring cohesion, direction and connection within the team and at the internal and external interfaces.

4. Competences for learning-friendly work design

According to the VDI/VDE Standard 7100 “Learning-friendly work design. Goals, benefits, terms and definitions” [34] the design options for learning-friendly work in general can be broken down in eight fields of action: Leadership, competence development, learning culture, communication, work organisation, work tasks, technical infrastructure and installed learning solutions [35]. These fields of action can in turn be assigned to the MTO model, which with human (M), technology (T) and organisation (O) delineates three fundamentally different but closely interacting perspectives from each other and thus offers a structuring means for the complex world. An integration of the two models offers an identification of different practical fields of action of what can be called learning-friendly work or work conducive to learning. The figure provides an overview of the concept of the standard.

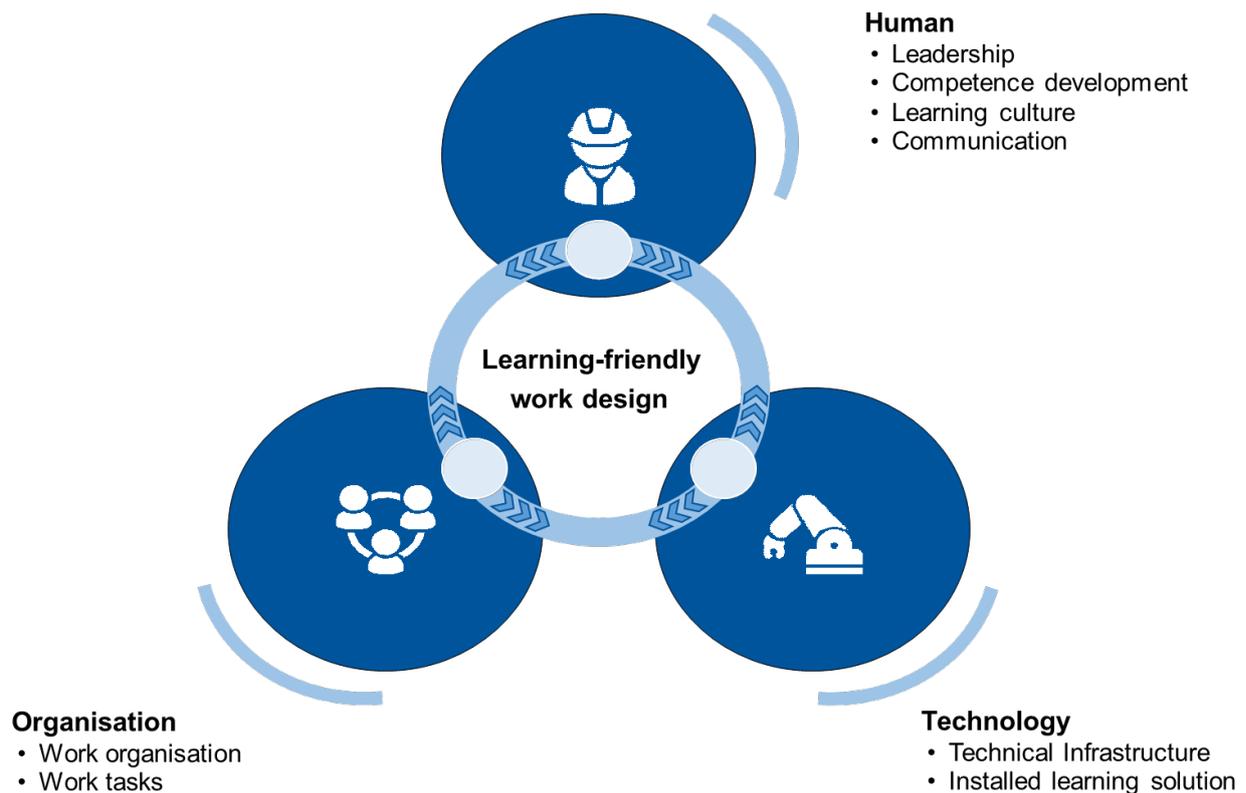


Figure 3: Perspectives on learning-friendly work design
(own illustration according to [36] and [35])

The figure illustrates the holistic orientation of learning-friendly work design. The fields of action of the human perspective are leadership, competence development, learning culture and communication. Fields of action in the organisational perspective lie work organisation and work tasks. The design of technical infrastructure and installed learning solutions are the focus of the technology perspective in terms of fields of action promoting learning. The standard takes a closer look at these different perspectives and takes into account interactions and interfaces. Since it is not only the isolated design of the individual perspectives but it is the design of the relationships between people and technology, technology and organisation as well as organisation and people which enables the full potential of a learning-friendly work design to be realized.

And this is where the link to leadership competences comes into play. Since the three perspectives are all interrelated between each other and leadership is a central field of action in the human perspective, leadership itself is interrelated to all other fields of action as well and, furthermore, can be interpreted in a competence-oriented way: In this sense, leadership needs to foster and develop learning-friendly work and it is a leadership competence to design such kind of work systems, in particular, of production work. Leadership competences then include competences to develop competences of employees, to establish fostering conditions for an appropriate learning culture as well as to communicate with the employees and within the organization appropriately. Furthermore, leadership competences include discuss and decide on the technical infrastructure of the work systems and the learning solutions to be installed. Leadership competences for learning-friendly work finally include an understanding of work organisation and work tasks. How do digital technologies impact work organization and work tasks in production work and what does that mean for leadership, which competences are needed in this respect?

5. Conclusion

As a first step, this contribution described the evolution of digital leadership highlighting the unique features of digital leadership against traditional management. In the next step, the major challenges of leadership arising in the context of digital transformation were discussed. The interviews carried out in the course of the project ella4.0 and the project work itself led to the conclusion that interactional competences and interactional work are the core of leadership work in digital transformation. Furthermore, leadership of the future needs also competences for a work design conducive for learning. Obviously, these two competence bunches depict the core future competences of managers and executives in production.

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