THE FUTURE OF EMPLOYMENT - CHALLENGES IN HUMAN RESOURCES THROUGH DIGITALIZATION

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Abstract: *New information and communication technologies have entered the market, facilitating full automation across a broad range of industries. This development is called Industry 4.0. Current predictions claim, there will be a redistribution of the workforce and a redesign of job profiles. New requirements are being placed on employees in terms of digital competence, problem solving or human-machine communication. For companies, it is going to be crucial to develop an adequate personnel development strategy as part of their corporate strategy, thus providing various accompanying measures for the change process. What are the challenges the Human Resources departments are facing in their efforts to support their employees? This paper deals with various aspects of human resources and the impact of digitalization on the workplace of the future. Therefore a capability maturity model was developed and will be presented within this article. Using the model, companies can detect their individual level of digitization in the Human Resources field and will be able to implement a future development strategy.*

Keywords: DIGITALIZATION, HUMAN RESOURCES, EMPLOYMENT, CHANGE MANAGEMENT

1. Introduction

A great deal is being written and said about the fourth industrial revolution. It is widely considered to be the solution for sustaining a competitive position as an industrial company in industrialized European countries. The use of internet and innovative information and communication technologies present numerous opportunities to increase productivity or establish a unique selling position. The integration of state-of-the-art information and communication technologies in production allows machines, logistic systems and operating materials to exchange information independently and in real time (Ramsauer, 2014). By means of cyber physical systems the physical world is enabled to merge with the virtual world. As a result active communication between machines and products can be established (Bauernhansl et al. 2016) This leads to enhanced flexibility in production through location- and time-independent control. That causes a substantial increase in data volume which is called Big Data (Kagermann et al. 2013; Bauernhansl et al. 2014; Spath et al. 2013). Therefore companies are forced to be either more innovative and invest in change processes or lag behind national and especially international competitors (Spath et al. 2013). It is important to mention that the rapid progress of digitalization does not only influence production and manufacturing. Nearly all departments can potentially benefit from a greater degree of digitalization. As an interface responsible for all employees within the company, Human Resources (HR) is particularly challenged by the drafted changes.

These aspects lead to the question: What are the challenges Human Resource departments are facing in their efforts to support their employees?

2. Changes through digitalization

As mentioned before, the constant increase of digitalization will shape the working environment in every company within the next years. Though it is important to mention, that not every branch and profession will be affected similarly (Spath et al. 2013; World Economic Forum 2016).

This chapter deals with aspects of future work resulting from digitalization and discusses the impact of the fourth industrial (r)evolution on the current labour market.

The conditions presented in the introduction frame the workplaces of the future. Figure 1 outlines some main new working conditions and gives examples of competences that are necessary for the respective field of action.
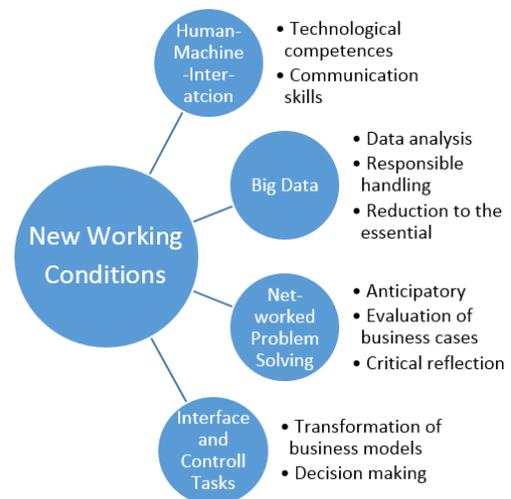

Fig. 1: New working conditions through digitalization.

Current predictions state a redistribution of the workforce and a redesign of job profiles. Due to the outlined requirements, executing activities will decrease whereas indirect labor such as interface or control activities will gain in importance (Spath et al. 2013). New requirements are placed on employees in terms of digital competence, problem solving or human-machine communication (Botthof/Hartmann 2015). The Future of Jobs report 2016 for example shows that nearly all modern workplaces will demand a combination of mathematical and interpersonal competences (World Economic Forum 2016). Employees must be able to define variances in production in time, develop efficient, holistic strategies and evaluate the results of these measures.

A comprehensive study concerning the future of employment by Frey/Osbourne examined the automation potential of various professions in America. They found that almost half of the analyzed jobs would be threatened by effects of digitalization over the next 10 to 20 years (Frey/Osborne 2013). A follow-up study was done in Germany: Experts pointed out that the influence of the technical automation potential cannot be equated with possible impact on the employment rate. Machines have the potential to alter workplaces which does not mean that they replace each affected job. Because of the digital transformation a significant number of new jobs could also be created, e.g. for the production of new technologies (Bonin 2015). As a whole, these studies show that the work environment will change fundamentally. For companies, it is going to be crucial to develop an adequate human resource management strategy as part of their corporate strategy, thus providing various accompanying measures for the change process (Jana-Tröller 2009; Botthof/Hartmann 2015). A recent study of Kienbaum shows how

little effort human resource manager put on HR strategies. Only 40% of the 190 asked HR manager indicate that they use instruments for personnel planning. Even fewer, namely one quarter, stated that they use strategic competence planning methods. The reason that is given most often is inadequate expertise respectively a lack of appropriate business-processes (Kienbaum Consultants International GmbH 2015).

3. Methodology

In order to face the outlined challenges, the Institute Industrial Management together with an Austrian industrial enterprise developed an Industry 4.0 roadmap containing, amongst others things, capability maturity model.

3.1 Capability maturity model

A capability maturity model supports companies in estimating their current situation regarding an examined field of action. Therefore, various criteria relevant for the aforementioned topic must be defined first. Each aspect of the instrument under discussion is supported by a central question and several key words that are related to it. This information gives the company a better understanding of the particular subject area. Thereby misunderstandings can be avoided and it is easier for the decision-maker to define and measure the proper course of action. The central questions of the area 'Acceptance and application of new technologies and media' is given as an example: How is the acceptance and openness towards the increased use of new technologies and media viewed? How well do the employees deal with it? The supporting key words for this field are employee acceptance, motivation and employee interest.

Secondly a different stage of development must be formulated for each factor. Usually the number of stages is between three and five in order to guarantee easy use for the operator. Stage one describes basic conditions whereas the highest stage represents maximum maturity (Allweyer/Knuppertz 2009). The previously introduced model contains five maturity levels based on the outlined central question. These levels go from none or low parameter value up to innovative and future oriented activities. It is important to say that the capability maturity model is a floating instrument. This means that several maturity levels must be adapted according to technological development. Activities or instruments that are highly innovative today and are therefore related to the maximum stage of development can be antiquated within a few years. If this is the case a new innovative maximum stage must be defined in order to secure permanent improvement (VDMA Forum 2015).

As mentioned before, when working with the tool, companies have to evaluate their current level of development. Therefore, every specification must be reviewed and measured by defining the percentage of achievement. Depending on how strongly the company's status correlates with the aspects of the particular maturity level, the analysis of the model shows a different color following the logic of a traffic light. If the approaches achieved more than 80% of a particular level the field turns green. Partly achieved levels (between 20% and 80%) are orange. If the level of fulfillment is lower than 20% the maturity level is not achieved (Hammer 2007). The highest fully achieved level of development is equal to the level of maturity of the particular aspect. These results are visualized for the company and can be seen as a basis for further development concepts.

Using such a model decision-makers within a company can easily measure the level of development. Furthermore, companies can adopt suggested activities that are applicable for their organizational framework. Capability maturity models are also useful for strategic planning when conducting a variance analysis. The results visualize gaps between the current situation within the company and actual best-practices. Investigating the differences

individual actions can be planned and implemented (Bechtold et al. 2014).

3.2 Process model

It is important that the whole process of development proceeds systematically. Therefore, an accompanying and transparent multi-stage process model is necessary. This instrument supports companies during the implementation of activities within the detected gaps. Extensive projects are divided into smaller process steps. This makes complex projects more transparent which has a positive impact on planning and controlling (Leimeister 2012).

The developed process model (Industry 4.0-Roadmap) contains three major phases: analysis, goal setting and implementation. This article focusses on the analysis phase which contains a capability maturity model.

4. Results

Based on the assessment of Hammer the developed Industry 4.0-Roadmap addresses five areas: Purchasing, Production, Intralogistics, Sales and HR (Employees) (Hammer 2007). During the last few years a capability maturity model was developed for every field. According to the outlined research question, this article focusses only on the HR model.

The field of action deals with various aspects of human resource management that can be allocated to different steps of the strategic personal development process. The approach of Ryschka/Solga/Mattenkott defines the process as follows: Based on the business objectives, the required manpower must be defined. On this basis a HR development (HRD) concept must be generated, implemented and transferred into the daily workflow. In order to guarantee the success these HRD actions must be evaluated. Thereby continuous improvements can be made to enable effective HRD with a high level of quality (Ryschka et al. 2011).

In this respect the capability maturity model covers aspects of all those phases, this can be seen in the table below.

Table 1: *Values of the HR capability maturity model allocated to the strategic personal development process of Ryschka et al.p. 22ff.*

Process steps	Defined areas of development			
Business objective	Corporate strategy	Organization and democratization		
Define manpower requirements	Expertise	Knowledge management		
HRD design	HRD strategy	Flexible working models	Healthy and secure workplace	Employer Branding
Implementation of HRD activities	Internal information and communication	Change Management	Process orientation	
Transfer to daily work	Acceptance and application of new technologies and media	Learning competence		

The challenges through digitalization in HR are not only limited to HR activities they also affect companywide topics starting with the business objective. Industry 4.0 affects the whole company and therefore must be addressed by the corporate strategy. An increase in digitalization has far-reaching effects and requires appropriate framework conditions. Strictly hierarchical organizational structures and a lack of democratization within the company influence the development negatively (Ittermann et al. 2015).

When the basic framework is established, the company has to define what kind of new expertise is required. A process oriented competence management including a knowledge management system serves systematization (Leinweber 2013).

The next step is the human resource development design in order to support the employees in the digitalization process. An extensive HRD strategy combined with active employer branding forms the basis. This should include individual development plans for every employee, as well as activities that create supporting working conditions (Sorko/Kreil 2016). Flexible working models such as teleworking or flexible working hours also in production areas and healthy workplaces are good examples in this respect.

After planning the strategic competence oriented HRD process the outlined activities must be implemented. Therefore, it is important to assure a comprehensive change process which prepares the employees for the change. At this stage intensive and clear internal information processes are necessary (Sorko/Kreil 2016).

The implementation phase is completed from the time the innovations are integrated into the daily workflow. HR responsible has achieved broad acceptance among the employees. Furthermore, this has created an understanding of the importance of continuous development in the context of digitization (Becker 2011; Tschumi 2014).

The accompanying evaluation process will reveal further potential for improvements which leads to an adaption of all previous phases of the strategic personal development process (Ryschka et al. 2011). This finally leads to a continuous adjustment of the individual degrees of maturity which enables the company in taking necessary actions to achieve an even higher degree of maturity.

5. Discussion

The outlined HR capability maturity model tries to fill the needs of companies not only in regards to providing innovative business solutions but also in terms of usability. Though specific evaluation criteria are defined it is important to understand that these fields of action cannot be seen separately. Rather they are interrelated and should be developed as parallel as possible.

Thus working with the model demands as much readiness for innovation and change employees and decision-makers within the company.

Especially in the HR field, a uniform approach throughout the company is necessary to guarantee a successful implementation in the long run (Sorko/Kreil 2016). Focusing only on one division leads to uncertainty among the employees. This results in a negative attitude towards the increase in digitalization.

Furthermore, the characteristic features of the outlined aspects show that a high degree of maturity in the field of action can only be reached through active involvement of employees (Sorko/Kreil 2016). HR cannot be seen as a closed department, but as an interface between employees and the company. The goal must be to unite both parties in order to be able to implement the necessary changes successfully for both the employees and the company.

6. Conclusion

Summing up industrial companies are permanently intended to improve their competitiveness with the aim to provide their lucrative surviving. The use of Internet and advanced information- and communication technologies represent a numerous of opportunities to increase efficiency and effectiveness of the companies processes. One of the big questions of companies managers are "How should we use these new technologies in our company?" and "How does this affects to our employees?"

One of the requirements to find answers to the question above is the analysis of the current situation of the company. In close cooperation with a leading manufacturer in Austria the Institute Industrial Management developed a so-called "Industry 4.0 roadmap" to find out the company's current level of development. One result of this cooperation was a transparent multi-stage process model, which allows a structured step-by-step approach involving relevant managers and other employees of the company. The developed model "Industry 4.0-Roadmap" addresses five company-areas (Purchasing, Production, Intralogistics, Sales and Human Resources) and contains five maturity levels based on specific questions for each area. With a common percentage classification of each maturity level the current situation in the areas of the company can be shown. After the actual situation is presented, the management has to determine the future state in answering the question: "What level of maturity do we want to achieve in our company?" Some requirements for employees can be derived indirectly from these future specifications. One of these requirements are the increased digital competences of the employees. Based on the new requirements an adequate human resource management strategy as part of the corporate strategy should be generated implemented and transferred into daily work and should lead to an individual development plan for every employee. Based on the objectives mentioned above, the presented model is a suitable instrument for countering the challenges of HR through digitization adequately.

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