How to prepare workers for logistics innovations today and tomorrow

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Artificial intelligence and the Internet of Things enable new and non-foreseeable potentials in various development and application scenarios. This disruptive and exponential development in informational technology has triggered a rapidly falling half-life of knowledge that underlines the importance of lifelong learning and the fast adaptation to new situations in logistics.

Introduction

The term *logistics* is ambiguous and has been examined from different perspectives in scientific literature. As an application-oriented scientific discipline, logistics analyzes the flow of goods in collaborative economic systems and provides recommendations for their design and implementation. Furthermore, logistics can be discussed as a branch that connects value chains of various dimensions (Pfeiffer, 2016). As an activity, logistics includes the spatial-temporal transformation of goods, handling, packaging, order-picking, and sorting (Baumgarten et al., 2004).

for preparation, applied in the near future. Accordingly, the paper concentrates on logistics as an activity and provides insights to the working fields of truck driving and transport planning.

Methodology

Practice-oriented examples are related to distribution logistics and provided by the expertise of a senior transport manager employed at one of the largest food retailing companies in Germany. After a brief introduction of a working system model, two cases are discussed. These cases concentrate on a short work task description and an explanation of how workers are prepared for logistics innovations, both
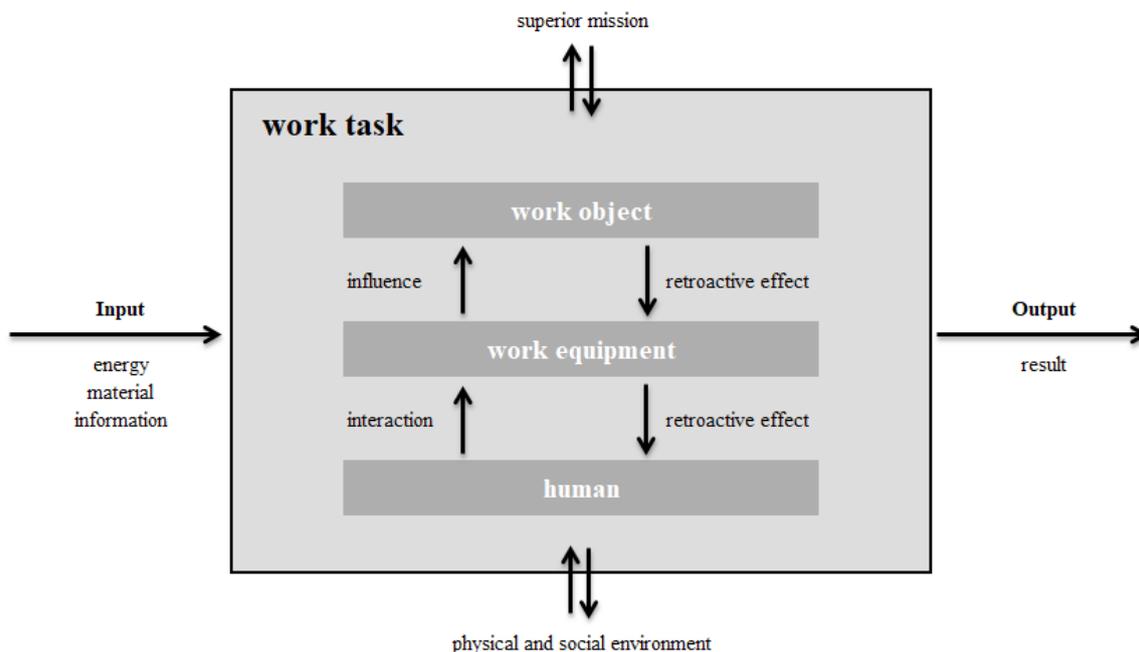

Figure 1. Working system

Source: Authors' own illustration based on Hardenacke et al. (1985), in Luczak (1997)

The aim of the present paper is to provide practice-oriented examples of applied procedures when preparing workers for logistics innovations today and to discuss possible ways

in the past and today.

To be able to estimate how human workforce will be prepared in the future, it is necessary to include possible

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developments in digital technologies. Therefore, a scenario technique used in scientific literature in order to estimate future development has been applied. The advantage of this method over other instruments is that the future is understood as a possibility space with many different directions of development and not as a fixed track (Gausemeier et al., 2009). The primary influencing factors are digitalization as a development boost causing disruptive changes and a shortage of specialists caused by the demographic change and an aging workforce (Eisenmann, Ittermann, 2017).

The working system as a frame of reference for practice-oriented insights

In order to explain the way how workers are prepared for logistics innovations today, the model of a working system is used. The focus of the model is the work task, which is derived by a superior mission of the organization (Figure 1).

To accomplish the working task, the human resource impinges on the work object by using work equipment (Luczak, 1997). Successful interaction between humans

tions related to track-and-trace systems. Mobile devices or handheld scanners are currently used to display work tasks for the truck driver; for example, to load a certain amount of containers for a grocery store and deliver them within a given time window.

In order to fulfil such tasks, the truck driver must scan all relevant 1D barcodes, which are attached to the containers, load them into his or her truck, and record differences between the data provided by the mobile device and the determined condition of transported goods. Furthermore, the mobile device is used to record the activities in reverse logistics. Figure 2 describes the working system of a truck driver in distribution logistics of food retail companies.

Currently, all truck drivers at a depot are trained intensively whenever disruptive innovations in track and trace systems take place. At the food retailing company examined in this case, an intensive seminar-based training was held for all truck drivers when the first track and trace system was integrated in 2007.

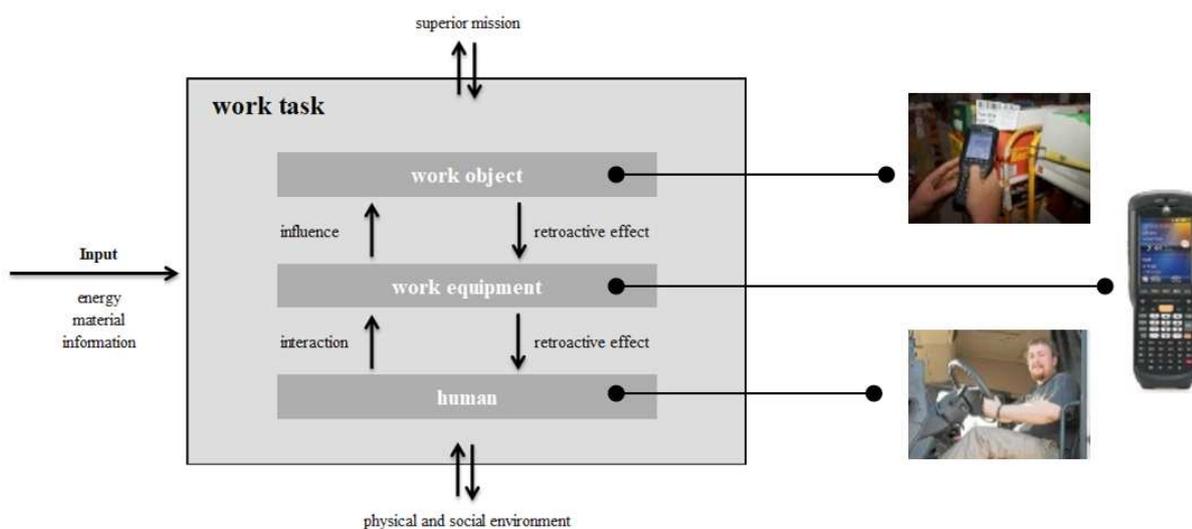A second wave took place in 2014 with intensive semi-

Figure 2. Working system of a truck driver in distribution logistics

Source: Authors' own illustration based on Hardenacke et al. (1985), in Luczak (1997)

and the work equipment is necessary and requires a certain level of qualification. In addition to the input and output factors, exogenous factors such as the physical and social environment influence the working system and subsystems (Schultetus, 2006).

Case 1 – Preparing truck drivers for logistics innovations today and tomorrow

Truck drivers working in distribution logistics of food retail companies have to face changes in digital innova-

nar-based training supported by a digital mock-up with a demo tour. The need for this preparation was, on one hand, derived by a new design; on the other hand, a different operating principle significantly extends the processes covered in the whole working system.

In 2018, a third wave will take place in which design and hardware will change fundamentally. The truck drivers will be prepared to face these changes by conducting a self-study with a digital mock-up-based demo tour, an
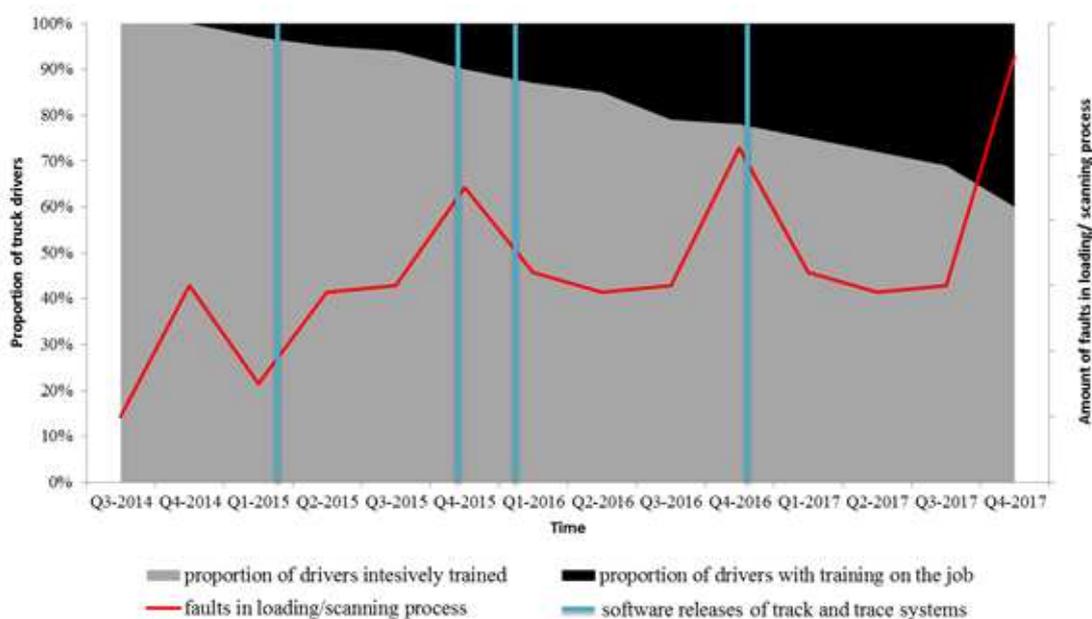
Figure 3. Relation of estimated training level and faults in loading/ scanning process for 2014 to 2017

Source: Authors' own illustration

online video playable on a smartphone to explain the functions and features of the mobile device, and two weeks of support from experts placed in the area of the warehouse where the truck drivers are loading their trucks.

New truck drivers who begin work after these waves of disruptive innovations occur due to an increase of transportation capacity in a depot or due to fluctuation effects are not prepared by intensive seminars but by on-the-job training from existing drivers. In this context, a loss of knowledge is expected and can also be traced back to the fact that new releases cause slight changes.

The expectation can be conditionally proven by faults occurring in the loading and scanning process, which are measured in the amount of containers that not scanned properly and were therefore left back in the warehouse. All contents described are summarized in Figure 3.

In the future we expect increased fluctuation of truck drivers, as well as more frequent and extensive changes in digital technologies. Without proper preparation, modifications in the technosphere and infosphere will reinforce the truck driver's potential for faults while fulfilling working tasks. Consequently, the future approach is a constant refresh and training of knowledge for all truck drivers without waiting for disruptive changes in hardware or software.

Case 2 – Preparing dispatchers for logistics innovations today and tomorrow

Dispatchers working in distribution logistics of food retail companies have to face changes in digital innovations related to transport planning systems. The working system is used to plan tours with the aim of ensuring a punctual, complete and cost-efficient delivery of grocery shops. The bases for their work are orders placed by the shops and available resources as trucks ready for transportation. Figure 4 describes the working system of a dispatcher in distribution logistics of food retail companies.

The increasing amount of available information (1) caused by the technical development of logistic systems in the last years triggered a performance enhancement of transport planning systems (2). As a result, a constant improvement in the level of competences for dispatchers is required (3).

Today dispatchers are schooled in a manner similar to truck drivers in a seminar concept that is held whenever disruptive changes for the working equipment take place. New employees are prepared by an intensive training on the job that lasts at least half a year. There is currently no preparation when add-ons for the planning software are introduced, except when release descriptions are provided. These documents contain all new features without filtering relevance or importance and are written from a technical point of view because they are provided by the IT business unit.

The result is an increasing amount of features that are not used despite being available. Figure 5 illustrates this by contrasting available and used features. The development of available functions is based on software releases and updates. The increasing usage of the software in Q1-
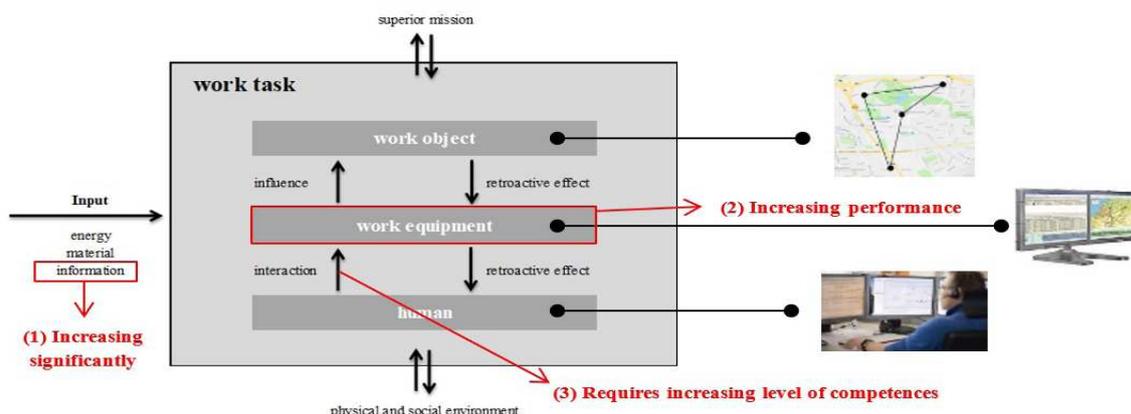
Figure 4. Working system of a dispatcher in distribution logistics

Source: Authors' own illustration based on Hardenacke et al. (1985), in Luczak (1997)

2016 and Q4-2016 is not attributable to the preparation of employees but to a change of the work task.

The scientific literature predicts an exchange of roles in logistic systems with a transfer of executive human work to
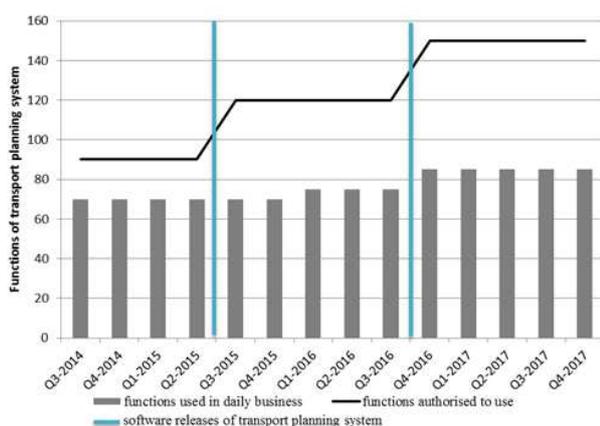

Figure 5. Relation of available und used functions of transport planning system for 2014 to 2017

Source: Authors' own illustration

computer systems. Therefore, employers have to search for possibilities to transmit new available features to employees and to lower possible acceptance and resistance hurdles when increasing automation or implementing artificial intelligence (Klumpp, 2017). This will be increasingly important due to the fast, disruptive, and exponential development in informational technology and due to technological advances. A rapidly falling half-life of knowledge underlines the importance of lifelong learning and the fast adoption to new situations in logistics (Wróbel-Lachowska, 2018).

Conclusion

This paper has presented practice-oriented examples related to distribution logistics provided by the expertise of a senior transport manager employed at one of the largest food retailing companies in Germany in order to gain insights into how workers are prepared for logistics innovations today. As a frame of reference, the working system introduced by Hardenacke et al. was applied to the cases of how truck drivers and how dispatchers are prepared for logistics innovations today. Similarities of the two cases are the emergence of an aging workforce and a lack of specialists, the preparation whenever disruptive innovations take place, and the type of training that is carried out by seminar-based training methods and recently with digital mock-ups.

To prepare truck drivers and dispatchers for logistics innovations, a rapidly falling half-life of knowledge can be observed that underlines the importance of lifelong learning and fast adaptation to new situations in logistics. Employers have to turn away from inflexible training rhythms and start to adapt permanent methods for qualifying workforce. Schooling truck drivers through gamification, such as the MARTINA application provided by FOM University of Applied Science, while they are waiting for new working tasks can be understood as a role model of efficient, effective, and constant improvement of the qualification of workforce.

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