

10 Artificial Divide: The New Challenge of Human-Artificial Performance in Logistics

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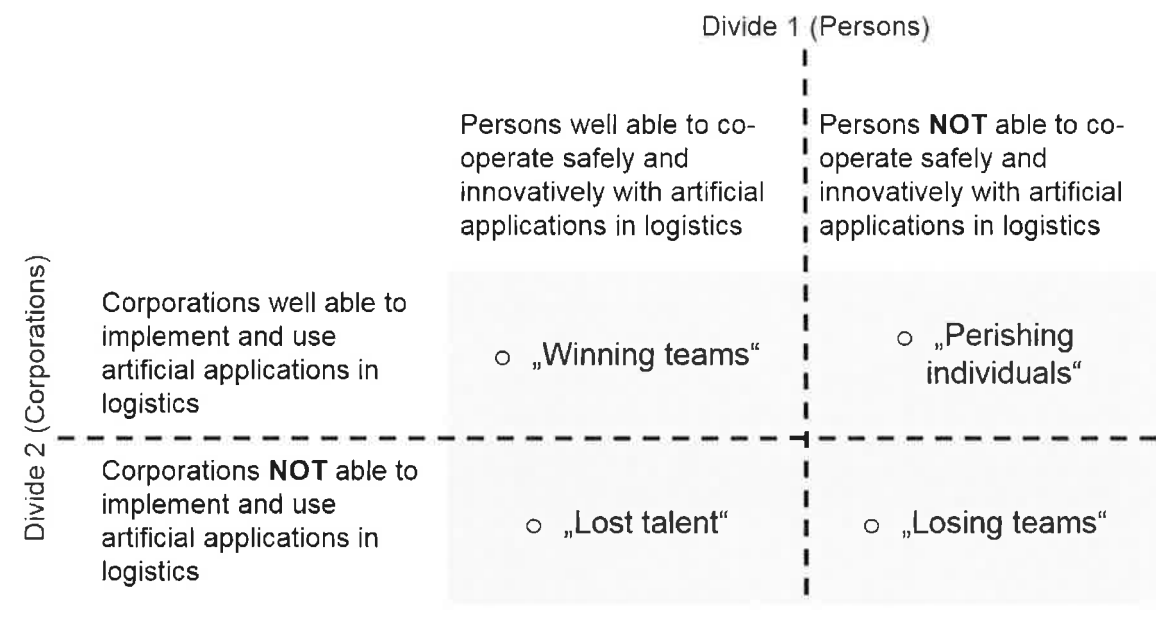
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10.1 Introduction

Logistics and supply chain management are undergoing a fast change due to technological but also social and market evolutions within the global economy [1], [2], [3], [7], [8], [16]. Autonomy, based on artificial intelligence as well as customer demands regarding customization, cost effectiveness and sustainability are the main driving forces behind these developments [5], [6], [9], [12]. But the core issue among these developments is the question about the future form and *performance of human-artificial cooperation* as this chapter argues. Whereas in the past in production and transportation the working areas of robots and humans were neatly separated and in case of cooperation i.e. in truck driving the roles were clear: Human workers were controlling and taking decision, machines and robots were doing the – dull – mechanical tasks of production and transportation. But for the future things are changing as automation enters a new stage of *artificial intelligence (AI) applications*: Robots and machines, even trucks and other items in the supply chain (containers, products, transportation equipment) will be able to take informed and advanced decisions themselves, leaving the human workforce with a *control and oversight role* [11], [13]. The qualification requirements for humans are therefore more along the lines of *cooperation with artificial intelligence applications* as well as within a „*know-when*“-domain: Humans have to recognize and decide for example when to override and stop automated applications such as autonomously driving trucks on motorways.

The chapter is structured as follows: In Section 2 the current trends and technological developments in transportation – regarding the four main transport modes – are outlined. Subsequently, in Section 3 the overarching vision of the Physical Internet is connected to these automatization trends and implications are described. Section 4 is detailing the important field of developments in human-artificial cooperation for logistics in the automatization age and within the concept of the Physical Internet. Section 5 is describing the core hypothesis of an upcoming *artificial divide* among workers as well as corporations in the logistics industry. The final Section 6 is providing an outlook regarding future research questions and developments.

Figure 10.3 Artificial Divide



Derived from this definition of an „artificial double divide“ in the future of logistics processes, four specific groups of persons or teams (understood as corporations or even complete supply chains) in logistics may be recognizable:

1. In a „winning team“ configuration, (mainly) individuals as well as corporations very well able to cooperate with and use AI applications in logistics are combined. This combination will bring about the best possible effects and benefits of AI application in the specific logistics processes in practice.
2. In the opposite case for „losing teams“, (mainly) individuals and corporations not able to cooperate with AI applications in logistics are working together. This may result in cases where a lot of potential is lost and the average process costs may be significantly higher than with competing teams (Corporations or complete supply chains). It has to be noted that this is not only the case of *no* AI applications are used at all (corporate misjudgement or failing investment capacity) or if they are implemented rejected by human workers („constant override mode“). But also cases where corporations are spending a lot of money and are not properly using the AI systems or fail to prepare and train the workers with these applications may end in this category.
3. Interestingly, there are also mixed combinations, i.e. when persons very well able to cooperate with AI applications in logistics are working within corpora-