

IMPROVEMENT PROPOSAL OF POSTAL SERVICE PROVIDER – IN THE CONTEXT OF THE INDUSTRY 4.0

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Abstract: *For postal service providers to meet the growing expectations of users, technological processes organization is one of the most important factors. In the context of the Industry 4.0 and the overall digitalization of the business processes, the need for the postal service providers to adapt to new challenges arises. Postal service provider face challenges, not only to transform their technological processes, but to also adapt to competitive market and growing consumer needs and expectations. This research focuses on the proposal of improvement of postal service's business processes for several types of problems in the context of the digital transformation and the Industry 4.0.*

Key words: *Industry 4.0, technological processes, sorting phase*

1. Introduction

Traditional technological phases in the postal system consist of five phases, as shown in Figure 1. First phase is the collection of postal items at post offices and other access points. Inward sorting is the preparation of the shipment for transport to correct delivery destination or address. The transportation phase involves the transport of sorted consignments using various modes of transport. Shipments are then sorted again at outward sorting where final sorting by address is carried out.

These processes of the modern postal and logistics service providers can be expanded, where additional processes can be recognized, as shown in Figure 1.

It is evident that the additional logistics processes are present in the technological phase that correspond to sorting in the traditional postal services value chain. These processes can be identified as: cross-docking, parcel and pallet distribution, different warehouse operations, means of manipulation, etc.

Driven by competition and customer demand, postal and parcel operators use advanced technology for different purposes, above all to improve operational efficiency and to offer new products and services [1]. Importance of the sorting phase is evident in the automated sorting and centralization of letter and parcel operations, where sequencing of letter deliveries to street level, as well as automated scanning is performed.

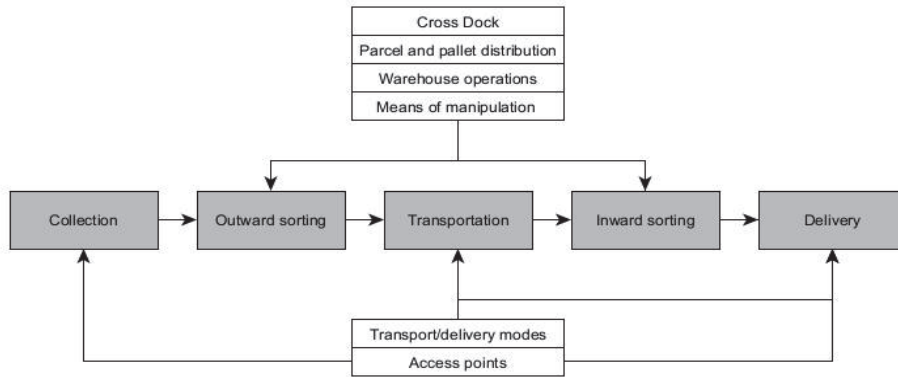


Figure 1. Postal service technological phases

A closer look to cross-dock operation is presented in Figure 2. Sorting of parcels in logistics hubs often correspond to cross dock type of sorting. It enables acceleration of the processes in the warehouses/logistics hubs. Main characteristic of the cross-dock type of warehousing operation is the collection of the parcels from different sources and their consolidation. Afterwards, delivery to one or multiple addresses is performed.

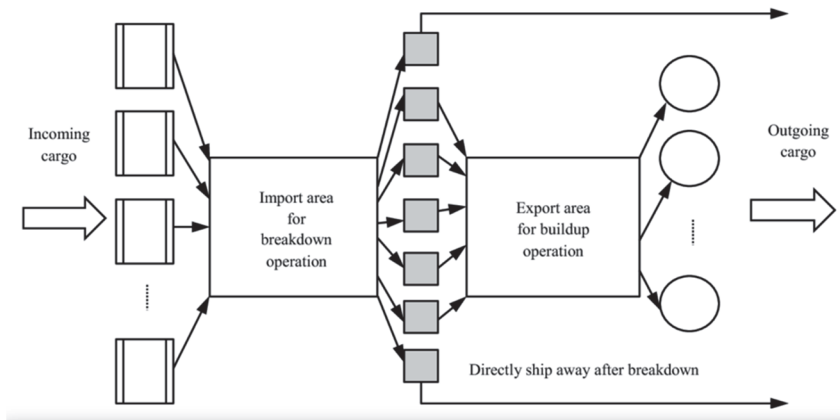


Figure 2. Cross docking scheme

Source: [2]

The emphasis of this research is put on the technological phase of sorting in the postal service fulfillment. The reason for this is complex processes that influence the technological phases that come afterwards – especially the delivery phase. Accuracy of the parcel sorting reduces misdirection of the parcels and possible parcel loss. Digitalization of the sorting phase, especially in the terms of the parcel tracking, information flow and the connectivity can directly influence delivery phase in multiple terms: information to the consumers, flexibility of the delivery, personalized delivery, optimization of the delivery routes and time planning.

2. Digitalization of technological processes of a postal service provider

Industry 4.0 is a known term that describes fourth industrial revolution. It can be recognized by the presence of ubiquitous mobile Internet, cybernetics, powerful and

cheaper smaller sensors, artificial intelligence, and machine learning. This, in the end, influences the final product provided to the customer and the adjustment of the production process.

2.1. Industry 4.0

Modern logistics processes are greatly influenced by the novel technologies. Industry 4.0 processes and services enable highly digital and autonomous operations in the logistic hubs and sorting facilities. Some of the known cutting-edge technologies of the Industry 4.0. are Internet of Things, Autonomous automation, Big Data, Blockchain technology, Artificial intelligence [3].

Figure 3 shows characteristics of digital and physical world and their interconnectivity within the entire supply chain. Information and material flow and connectivity between these worlds, powered by the infrastructure elements (sensors, actuators) generate high level of data-based analytics. The goal of the new technologies in this context is to transform from digital to “truly smart”.

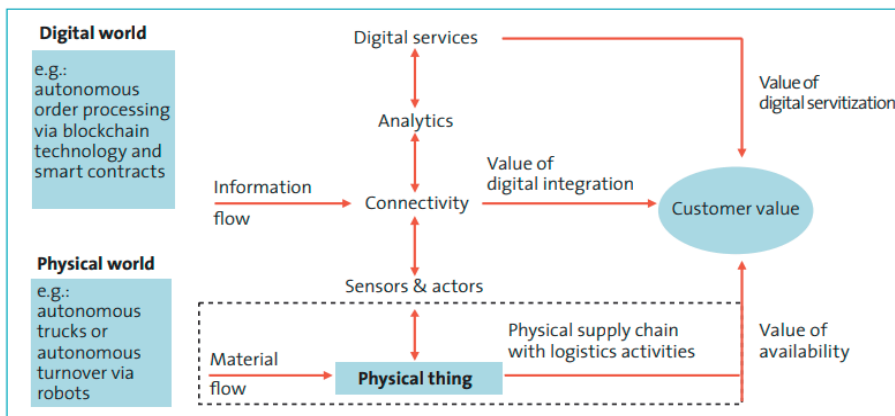


Figure 3. Industry 4.0 digital and physical world

Source: [4]

The main features of Industry 4.0 are [5]:

- Interoperability: cyber-physical systems (work-piece carriers, assembly stations and products) allow humans and smart factories to connect and communicate with each other
- Virtualization: a virtual copy of the Smart Factory is created by linking sensor data with virtual plant models and simulation models
- Decentralization: ability of cyber-physical systems to make decisions of their own and to produce locally thanks to technologies such as 3d printing
- Real-Time Capability: the capability to collect and analyze data and provide the derived insights immediately
- Service Orientation
- Modularity: flexible adaptation of smart factories to changing requirements by replacing or expanding individual modules

2.2. Digitalization of the parcel sorting phase

The challenge for the postal service providers is to efficiently use the advantages of the 4.0 Industry, with the aim to:

1. Better manage processes in all technological phases of the postal service fulfillment
2. Optimize processes in technological phases, especially last mile
3. Predict consumer behavior and to offer personalized services
4. Predict process plans and build future strategies

If the technological phase of parcel sorting is analyzed in more detail, then following processes can be identified:

- Receipt of parcels
- Warehousing/sorting
- Shipping/delivery to consumer

Each of the above-mentioned processes consist of sub-processes that enables continuous and unobstructed flow of parcels and their routing to the delivery address. More detailed preview of the sorting phase processes is given in the Figure 4.

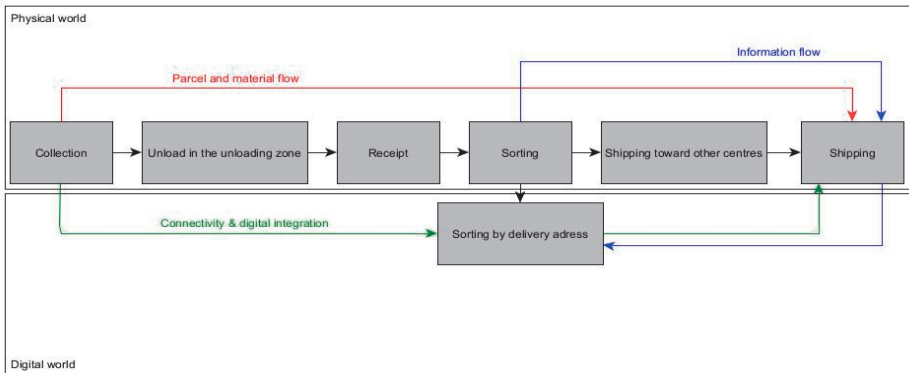


Figure 4. Industry 4.0 influenced sorting of parcels

Processes in the sorting parcels can be observed through digital and physical part of the technological phase. Analysis show that the parcel and material (physical goods) flow is harmonized with the digital world. In other words, each process of the parcel handling is supported by the digital world elements – information flow, connectivity and/or different digital integration steps.

Key objectives and impacts of the Industry 4.0 on the distribution centers are improvement of productivity and reduction of risk. In this context, most notable technologies include [6]:

- Vision picking/voice picking/AR
- Adaptive robots and connected automated guided vehicles
- Semiautonomous, flexible machines for value added services
- Fully automated picking and quality assurance to adjust to rapid changes in demand
- Next-generation distribution operation systems
- Smart, automated facility management for greater efficiency
- Safety enhancements and modularity

3. Proposal of processes improvement of a postal service provider in the context of the Industry 4.0

This chapter focuses on the improvement aspects of the postal service providers, with emphasis on the sorting phase and the digitalization of the business processes.

Improvement of the business processes when postal service providers are concerned can be analyzed through business strategies and infrastructure scope.

3.1. Adaption of business strategies

For postal service providers, strategic decision should be focused on the digitalization of the processes, or digital transformation. Table 1. shows some of the most important differences between traditional and the digital business strategies.

Table 1. Traditional vs. digital transformation strategies

	Traditional	Digital Transformation Strategy
Focus	Optimization of individual technologies and individual units	Focus on implications for products, services, and business models as a whole
Scope	The detailed content of the strategy	How to realize the organizational vision
Goal	Operational efficiency	Business transformation customer experience, operation and rescheduling of business models
Period	Several years	Continuous
Source of innovation	Talented individuals and competencies within the organization	Collaboration and effort, knowledge sharing between industries and different business units
The cycle of business model	Slow to average	Quick
Method	Forecast and plan	Experience and respond
Business model	Service provider, asset creator	Creating technology and synchronizing networks
Competitive advantage	Proprietary assets	The ability to transform and adapt

Source: [7]

It is evident that the transformation to digital world is a continuous process that recognizes business plans, production, and services, as a whole. Critical focus of the service-oriented markets is the ability to transform and to adapt to consumer requirements, as well as responding to user needs.

From the aspect of the human resources, connection, and collaboration between different organization units will contribute to better functioning of all the parts of the business flow.

3.2 Adaption of the infrastructure

Influence of the Industry 4.0 and net information and communication technologies on the infrastructure of a postal service provider can be analyzed based on several aspects:

- Development of electronic infrastructure as a support to different kinds of postal access points
- De-centralization of the logistic hubs
- Automation of the sorting facilities
- Adaptation of the existing technologies to better communicate and incorporate in information flow from the source to the destination of the postal service fulfillment.

4. Conclusion

Continuous changes in the industry and widely applied information and communication technologies have great impact on the postal services and logistics markets. Postal service providers are facing challenges on several aspects: growing competition on the market, acceleration of the business processes and growing consumer expectations and needs.

Challenge of the digitalization of the processes should be tackled from both strategic as well as infrastructure level. From strategic aspect, digitalization of the business processes is a continuous process that should be upgraded without major interruptions and bearing in mind challenges previously mentioned.

Infrastructure level should be focused on the existing technologies and their adaptation and improvement to better contribute to the information flow and analysis of the business processes in all the technological phases.

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Abstract: *Kako bi davatelji poštanskih usluga ispunili sve veća očekivanja korisnika, organizacija tehnoloških procesa jedan je od najvažnijih čimbenika. U kontekstu Industrije 4.0 i cjelokupne digitalizacije poslovnih procesa, javlja se potreba da se davatelji poštanskih usluga prilagode novim izazovima. Pružatelji poštanskih usluga suočavaju se s izazovima, ne samo transformacije svojih tehnoloških procesa, već i prilagođavanja kompetitivnom tržištu i rastućim potrebama i očekivanjima korisnika usluga. U radu je dan je prijedlog poboljšanja prilagodbe poslovnih procesa davatelja poštanskih usluga za nekoliko vrsta problema, u kontekstu digitalne transformacije i Industrije 4.0.*

Key words: *Industrija 4.0, tehnološki procesi, sortiranje*

PREDLOG POBOLJŠANJA PRUŽAOCA POŠTANSKIH USLUGA – U KONTEKSTU INDUSTRIJE 4.0

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