INFORMATION TECHNOLOGY FOR AUTOMATIC PARCEL LOCKERS

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Key words: parcel lockers, information technology, parcel delivery, software, mobile application

Introduction. Parcel terminals are automated terminals for issuing and sending parcels, goods and purchases in online stores. They come with built-in terminals for payment, and sometimes without, with unique mesh sizes, climate control – cooling or heating blocks. They are great for streamlining the delivery process, reducing time and costs, and even more so are excellent alternatives to mail during a pandemic, as they reduce the possibility of contact [1].

Main part. According to [2], the most attractive feature of parcel lockers is price of service, speed of service an availability 24 hours a day (Fig. 1).

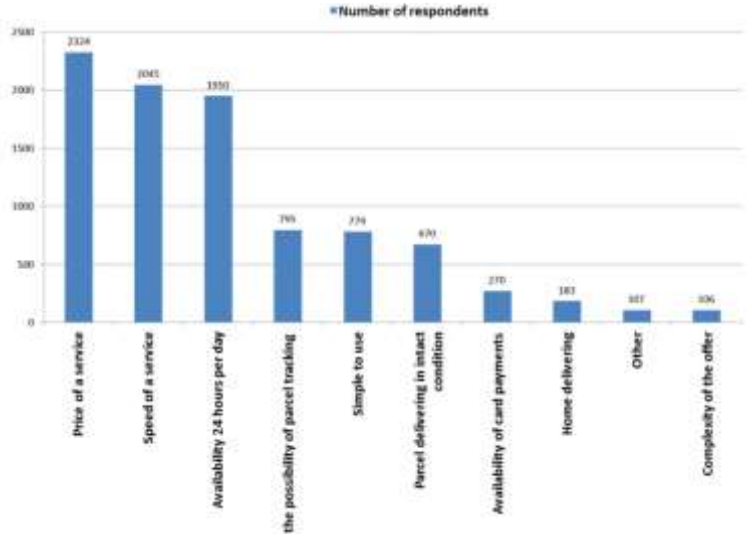

Figure 1 - Criteria for choosing parcel locker service [2]

In 2019, there were around 36,000 respondents in 41 countries. Respondents were asked which delivery locations they had used in the past year. As shown below, the most commonly used location was delivery to the home (66%), followed by delivery to a post office (21%), a postal service point (14%) and a parcel locker station (12%). Parcel locker stations were most popular in Estonia, Finland, Poland and Lithuania – delivery providers

in these countries have installed a huge network of lockers to drive e-commerce in the region [3].

Thus, it can be argued that parcel terminals are a promising method of urban delivery. However, their use presupposes the use of special software products. In these theses, we want to briefly analyze the software and programs that are used to operate the parcel machines.

Let's consider software for parcel machines based on the Soft-logic company product. They provide turnkey software and their platform is based on a single server. This server provides [4]:

- a single space that contains information about operations (delivery, return, shipping, storage) and their status;
- statistics of the network of parcel terminals (current load, storage time, etc.);
- monitoring and remote control of a network of devices.

The software allows to expand payment methods, and if a terminal is built into the parcel machine, then it can accept payment in cash, by card, through mobile services and electronic wallets [4].

The software has such key features as: the volume of the system (placement of up to 100,000 parcels / goods per hour), high performance and fault tolerance, support for various payment systems, which was already mentioned above, automation of input (barcodes, webcams, etc.), back office management, monitoring and control of equipment status, implementation of mobile and web services, monitoring and control of postal items, combining a parcel / product / locker with a payment kiosk to pay for third-party services, and many others [5].

In addition, the software has additional features that allow to [5]:

- Control balances and keep track of the consumption of ingredients (goods, components, cups, etc.);
- Transparent sales statistics for improving the business model (evaluating the efficiency of placing machines, replenishing ingredients);
- Equipment monitoring (vending hardware devices, payment peripherals);
- Building complex work scenarios;
- Integration with cash farms (reducing the cost of fiscalization);
- Integration with a payment terminal or self-service booth.

Company also provides an application for parcel terminals and a mobile application for couriers, which facilitates the work of staff during delivery and not only. Such integration with related systems occurs using the universal API (Application Programming Interface) [4].

Software functionality [4]:

- delivery of parcels in offline mode through the parcel terminal application;
- payment for orders on a parcel machine and cloud fiscalization;
- notification subsystem with sending email or SMS notifications to clients;

- mobile application for couriers based on Android or IOS;
- multiple parcels (after loading an order from several parcels into the parcel machine, a single notification is sent to the client and all parcels are issued at once);
- the ability to select the temperature regime for the cells of the parcel terminal;
- support for parcel terminals with two-way access (a system in which parcels are placed by couriers / sellers on one side, and customers pick them up on the other side);
- multilingual;
- various algorithms for working with the user (entering the code on the screen of the parcel terminal, scanning QR codes, providing libraries for integration into customers' own applications).

In order to connect a small online store to a parcel machine, you need to conclude an agreement and embed a shopping cart module on the site. When placing an order, the buyer chooses a convenient checkpoint or a partner point for issuing orders [6].

Thus, software for parcel terminals solves typical tasks for automating delivery and greatly simplifies access to contactless receipt of goods.

Software can provide asset and inventory tracking, management capabilities, and even create a history of delivered signatures and transactions. Such software is not designated for courier delivery management or supply chain management, and however its streamlines package operations solutions, it does not organize delivery logistics or operations. It can integrate with property management systems as well as with existing hardware, such as barcode scanners or label printers [7].

Conclusion. As we can see, parcel terminals are a promising area of urban logistics. The software used for such delivery technology allows you to conveniently manage data and analyze the information flow to all parties of delivery - sender, recipient and courier. An important advantage of the parcel terminals is the lack of direct contact between people during delivery, which during the Covid-19 pandemic reduces the likelihood of transmission of the virus.

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