

The system of Silesian Public Services Card (ŚKUP)

as a tool to control the quality of provided services

The ŚKUP system in the Municipal Transport Union of GOP was started in October 2015. After two years from its start more than 290,000 cards have been issued, all paper season tickets were cancelled, the distribution of selected type of single travel paper tickets was limited. Instead, nearly a thousand points of e-tickets distribution operates within the ŚKUP, and a multi-functional card works not only as an urban transport ticket, but it is used also as a parking card and can be used in more than a hundred public institutions. These functions are only a fragment of system capabilities, which for the administrators is a powerful tool for public services management. Also in the field of controlling the quality of provided transport services in KZK GOP.

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Because of very broad capabilities of the entire system it has been divided into modules, which are used to manage its individual elements. The tools, discussed in this paper, are two modules:

- 1. The analytical and reporting module (MAR)**, used to define and generate reports and to analyse the data gathered in the system.
- 2. The map module (MMP)**, which consists of a set of applications aimed at presenting the spatial data on a digital map, and in particular the current location of vehicles and at presenting the archive data of journey routes.

The mentioned elements are only two from among more than twenty various modules used to perform individual tasks. The applications mentioned above are used primarily to verify the transport carried out by the operators and are used for that since the system start, i.e. they have been successfully used already since 2015.

The transport organised by KZK GOP

KZK GOP employs now 37 carriers (4 municipal enterprises, 32 private companies, and Tramwaje Śląskie). Those companies operate 299 bus lines (including the night, holiday, and occasional lines) and 29 tram lines. Journeys to the KZK GOP order are carried out in the area of more than 40 municipalities of the Katowice conurbation (29 cities, KZK GOP members, and neighbouring municipalities). The transport is performed on the basis of contracts, specifying the conditions that must be met for each line by a specific vehicle. All contracts are signed based on open tender procedures. In the area of KZK GOP 85.92 million km are travelled annually (2016 figures). On working days the passengers are carried by 730 buses and 205 trams.

The task of employees of the Transport Services Control Section consists in supervising all those vehicles and controlling the performed transport. Their

Streszczenie

System ŚKUP w Komunikacyjnym Związku Komunalnym GOP uruchomiony został w październiku 2015 roku. Oprócz funkcji dostępnych dla użytkowników – pasażerów oraz mieszkańców, system jest także narzędziem do zarządzania usługami publicznymi, także w zakresie kontroli jakości usług przewozowych wykonywanych przez operatorów dla KZK GOP. W artykule opisane zostało wykorzystanie dwóch modułów – analityczno-raportowego (MAR) oraz mapowego, umożliwiających wykonywanie kontroli zarówno w czasie rzeczywistym, jak i weryfikację danych archiwalnych, dotyczących realizacji kursów linii jeżdżących na zlecenie Związku.

Słowa kluczowe: Śląska Karta Usług Publicznych, kontrola jakości usług przewozowych, KZK GOP

Summary

The system of Silesian Public Services Card (ŚKUP) as a tool to control the quality of provided services

The ŚKUP system in the Municipal Transport Union of GOP was started in October 2015. Apart from functions available to users - passengers and residents, the system is also a tool to manage public services, also in the field of controlling the quality of transport services provided by operators to KZK GOP. The paper describes the use of two modules, the analytical-reporting module (MAR) and the map module, enabling to carry out both the control in real time and to verify the archive data related to making the journeys by lines working to the Union order.

Keywords: Silesian Public Services Card, quality control of transport services, KZK GOP



The ŠKUP system is a tool much more complicated than elements visible to passengers

duties comprise checking: the punctuality of carried out journeys (including the control of proper stops servicing), the vehicles cleanness, their proper marking, the travellers service culture, and also – in cooperation with the subject-matter department – the assistance at detours determination, the photographic documentation of difficulties on roads (e.g. carried out repairs), and the verification of difficulties, in particular those notified by passengers. Those tasks are partly performed also by ticket inspectors (mainly related to the punctuality and the condition of the stop infrastructure), in particular the group of persons employed based on employment contracts. Their activity results, in justified cases, in contractual fines imposed on the transport companies.

All those actions are carried out by 19 persons employed in the section. The employees perform those tasks both on site, and also at their desks, in the KZK GOP office.

Ticket inspectors tasks

Before the system start a definite majority of employees were carrying out their duties on site. However, because of the number of persons employed in relation to the number of performed journeys, the sample of carried out inspections was naturally small. Each ticket inspector during his/her working day could control up to a few hundred travels. At that time working days were divided into two parts. The punctuality of travelling vehicles was checked during one part – inspections were carried out mainly on through stops and in major trans-

port junctions. In the second part employees were performing a comprehensive inspection of specific vehicles. They were checking: the equipment, the cleanness inside and outside vehicles, the working order of validators, the heating, the marking, the tariff-ticket information etc. In addition, they carried out tasks related with checking possibilities to determine detours, verification of difficulties, etc. Apart from the above, pursuant to provisions of binding transport contracts, all operators carrying out the transport work on lines organised by the Union were obliged to report daily the occurring irregularities (informing e.g. about disturbances or shortages in the journeys performance).

Because of the ŠKUP start the assumptions and the organisation of Transport Services Control Section work changed. The employees must still carry out inspections on site (in particular in the field of marking, cleanness etc.), also operators continue to be obliged to inform KZK GOP, as the transport organiser, about disturbances occurring during the day. However, the ŠKUP start substantially affected the possibility to verify and to control everything happening during the day in the transport organised by the Union. Because of the above, the work organisation of persons employed in the section was modified. Less than ten persons left out of more a dozen or so persons working daily on site, while the other employees are involved in the verification of data acquired from the ŠKUP modules.

◆ Analytical and Reporting Module

The analytical and reporting module (MAR) is undoubtedly one of the most important and widely used ŠKUP modules. This is a huge and difficult to overestimate tool, due to which it is possible to 'draw' precisely all the data gathered in the whole system. The module operates as a huge database, from which it is possible to create any reports, specifying together selected pieces of information. However, in this field it is necessary to be capable of operating such tools and creating lists with the required information.

For the needs of the transport services control the IT department staff created a relevant report, due to which it is possible to generate automatically the information related to the service of a chosen line or to the performance of its individual journeys. Such reports are now generated by controllers on a daily basis. They automatically specify the timetable and the actual times for the initial and final stops. In the case of any noticed irregularity, another, more detailed report is used – illustrating the line service for a selected journey. This specification presents in turn all stops serviced (or not) by the given vehicle. Such data allow to find very quickly situations, in which morning departures are late or for example omitting a few initial stops. In a similar way situations with early evening returns or missing service of e.g. a few final stops on the route are automatically visible. If an inspector observes any irregularities in those reports, he/she verifies them additionally on the map module.

Map module (MMP)

The map module is used to visualise the journey route on a base map. Data from vehicles are transmitted to the system every 20 seconds and registered on the map in the form of points, forming a line being a picture of specific vehicle route. Because of that it is clearly visible, that for example the vehicle has stopped on a stop or did not service it. Also any



changes of the route are clearly visible (the line goes in a different way than the timetable route), as well as time accelerations or delays as against the timetable. In such cases the colour marking the vehicle on the map changes (green – the timetable is observed without disturbances, red – the vehicle goes ahead of the timetable, orange – the vehicle is delayed).

What is important, also all operators of transport lines organised by KZK GOP have access to this module. Their rights are limited to the possibility of controlling only own vehicles, but due to that they can check on a current basis, how individual journeys carried out by their employees are performed.

MODULES OF ŠKUP DIGITAL INFRASTRUCTURE

Service point application APO – is used to service transactions carried out for customers – ŠKUP card users, and in particular: cards identification, issuing and ordering, the execution of ticket purchase and return services, card charging, concession coding.

Customer Portal Application APK – is a web application. It offers a possibility to apply for a personalised card, to acquire the information about the card status (personalised or non-personalised), and its service via Internet.

CallCenter Application ACC – ensures support for customer service, contacting by phone the KZK GOP Call Centre.

Internal communication module MKW – ensures bidirectional sending of messages: between the customer portal and ŠKUP operators and between ŠKUP operators.

Complaints module MRE – the application designed to service complaints made by the ŠKUP System users.

Distribution interface INT.DYS – the module supporting the service of non-personalised ŠKUP cards distribution. It enables ordering non-personalised cards for POP/POK points, SAD machines, and UPOS terminals based on the current information about the number of cards in a specific point.

Map module MMP – offers a set of applications aimed at presenting the spatial data on a digital map, and in particular the current location of vehicles on their routes.

Monitoring module MMT – the module's task is to supervise on a current basis the correctness of the ŠKUP System operation. The monitoring module regularly checks the condition of infrastructure elements (equipment and services). The module users can view the data visualised in the application on a current basis. The application ensures sending the information about alarms in the case of exceeding the predefined alarm thresholds.



The use of ŚKUP modules to control

One of most important functions of modules described above is not only a possibility to get the information in real time, but also a possibility to have an insight into the documentary data. The controllers operating the system can check selected archive journeys. Because of that it is also possible to verify the complaints and grievances received from passengers (e.g. for accelerated, delayed or non-performed journeys). As the system operators emphasise, during the control it frequently happens that archive irregularities are noted – in evident cases in such situations also contractual fines are imposed on operators.

The system comprises several modules enabling to manage it and to generate the data. Photo: Tram stop Katowice Rynek

On the left
Tram in 3 Maja street in Katowice

Despite having such an effective tool, the Union has not given up the obligation, imposed on the operators, to submit reports related to irregularities in the contracts execution. In the cases, where the data from the system and the carrier information coincide, only the performed kilometres are settled. When it turns out that the system indicates some ir-

Tools for centres switching NAMP – ensure an uninterrupted operation and a proper response to issues with the data processing centres (CPD) accessibility. The NAMP task is to monitor the network connections and services and to respond to critical situations related to the correctness of CPD operation.

Analytical and reporting module MAR – is used to define and generate reports and to analyse the data gathered in the system.

Operators settlement module MRO – is used to settle transport services for KZK GOP municipalities, local governments not being KZK GOP members, investors, and operators. The module is based on settlement modules developed for the above entities.

Fraud detection module MDN – allows to detect situations, in which the use of ŚKUP system can raise doubts, whether there was a fraud. Because of reports imple-

mented in the MAR application it is possible to detect, whether the ŚKUP system functionalities have been properly used, in accordance with the KZK GOP intention.

Ticket inspector settlements module – was developed in the form of a special report in the analytical and reporting module. The report is prepared based on a paper version of 'Report on tickets inspection' and is generated based on the data from the inspections carried out on the indicated date, for the selected ticket inspector having a defined official number.

Collection interface INTWIN – is the interface ensuring the exchange of data between the ŚKUP System and the KZK GOP collection system, comprising information on the carried out inspections, on the issued additional charges, and all other information necessary for proper and effective operation of the collection system.

tab_plan	tab_realiz	nr_boczny	godz_plan	godz_realiz	odl_p	przystanek	odl_ng	status	kol	typ_d_id
CN	CN	553	2017-09-01 13:00:00	2017-09-01 13:00:54	0	Zagórze Zajezdnia 3 (Sosnowiec)	0	PR	1	1
CN	CN	553	2017-09-01 13:03:00	2017-09-01 13:03:32	1,3	Zagórze Aleja Paderewskiego 2 (Sosnowiec)	1,3	PR	2	1
CN	CN	553	2017-09-01 13:05:00	2017-09-01 13:06:05	1,1	Zagórze Gwiezdna 2 (Sosnowiec)	1,1	PR	3	1
CN	CN	553	2017-09-01 13:06:00	2017-09-01 13:07:42	0,6	Zagórze Pekin 1 (Sosnowiec)	0,6	PR	4	1
CN	CN	553	2017-09-01 13:08:00	2017-09-01 13:09:22	0,6	Zagórze Osiedle 3 (Sosnowiec)	0,6	PR	5	1
CN	CN	553	2017-09-01 13:11:00	2017-09-01 13:12:56	1,6	Śródula Osiedle 2 (Sosnowiec)	1,6	PR	6	1
CN	CN	553	2017-09-01 13:13:00	2017-09-01 13:15:10	1,1	Sielec Osiedle Zamkowa 2 (Sosnowiec)	1,1	PR	7	1
CN	CN	553	2017-09-01 13:14:00	2017-09-01 13:16:12	0,5	Sielec Szkoła 2 (Sosnowiec)	0,5	PR	8	1
CN	CN	553	2017-09-01 13:16:00	2017-09-01 13:17:52	0,5	Sielec Wawel Kościół 2 (Sosnowiec)	0,5	PR	9	1
CN	CN	553	2017-09-01 13:17:00	2017-09-01 13:19:07	0,4	Sielec Wawel 2 (Sosnowiec)	0,4	PR	10	1

Fig. 1. Fragment of timetable implementation report: transport day 01/09/2017, line 723, bus, journey No 107

Source: own study

doza_id	nr_kursu	tab_plan	tab_realiz	nr_boczny	godz_plan	godz_realiz	przystanek	status	p_k
201709015	101@	CN	CN	553	2017-09-01 04:50:00	2017-09-01 04:51:14	Zagórze Zajezdnia 3 (Sosnowiec)	PR	p
201709015	101@	CN	CN	553	2017-09-01 05:50:00	2017-09-01 05:51:01	Czeladź Wojkowska Pętla 2	PR	k
201709015	102@	CN	CN	553	2017-09-01 06:12:00	2017-09-01 06:13:14	Czeladź Wojkowska Pętla 2	PR	p
201709015	102@	CN	CN	553	2017-09-01 07:16:00	2017-09-01 07:15:39	Zagórze Zajezdnia 3 (Sosnowiec)	PR	k
201709015	103	CN	CN	553	2017-09-01 07:20:00	2017-09-01 07:20:38	Zagórze Zajezdnia 3 (Sosnowiec)	PR	p
201709015	103	CN	CN	553	2017-09-01 08:18:00	2017-09-01 08:20:04	Czeladź Targowisko 1	PR	k
201709015	104	CN	CN	553	2017-09-01 08:54:00	2017-09-01 08:55:54	Czeladź Targowisko 1	PR	p
201709015	104	CN	CN	553	2017-09-01 09:51:00	2017-09-01 09:51:36	Zagórze Zajezdnia 3 (Sosnowiec)	PR	k
201709015	105	CN	CN	553	2017-09-01 10:00:00	2017-09-01 10:00:54	Zagórze Zajezdnia 3 (Sosnowiec)	PR	p
201709015	105	CN	CN	553	2017-09-01 11:01:00	2017-09-01 11:03:19	Czeladź Wojkowska Pętla 2	PR	k
201709015	106	CN	CN	553	2017-09-01 11:22:00	2017-09-01 11:23:17	Czeladź Wojkowska Pętla 2	PR	p

Fig. 2. Fragment of timetable implementation report: transport days from: 01/09/2017 to: 01/09/2017, line 723, bus

Source: own study

regularities and the operator has not reported them, the companies are additionally fined pursuant to the contract provisions. Very often also the data from the system is used to supplement the information from inspections carried out on site. The situation, which happened during the holidays, can be a clear example of incorrect contract execution. The inspector on site noticed that a third persons stands next to the driver, with whom the driver had a lengthy conversation (which is clearly forbidden and operators are fined for that). An additional analysis of this specific journey in the ŚKUP system has shown a number of additional irregularities, among other things a non-punctual execution of the timetable, and a forbidden action of drivers (perfectly visible on the map), who mid-route 'exchanged' passengers and each vehicle returned instead carrying out the journey to the route end, turned out to be a cher-

ry on the proverbial cake. Undoubtedly this is one of more interesting cases observed recently and noticed just thanks to the system, however the most frequently repeated errors are unserved stops or earlier departures.

On the other hand, both ŚKUP modules are used also e.g. to verify complaints made by passengers. Because of modules functioning within ŚKUP in numerous cases it is possible to verify the information quickly, without the need to contact the operator and to involve drivers, to arrange confrontations etc. In such cases very many accusations turn out to be simply unjustified. It is possible to state that there are widespread situations, in which a dozen or so minutes delay turns out to be a 2-3 minute delay, and a notified early departure is a departure on time, according to the timetable. The possibility of precise control and quick verification of infor-

MODULES OF ŚKUP DIGITAL INFRASTRUCTURE

BUSMAN interface – this software shall support the process of importing the data about timetables from the BUSMAN system, shall enable its supplementing by the users, and to make the loaded data available via the network services.

Tariffs and price lists module MTC – this is a tariff register containing the price list of fares and the rules for using the transport organised by KZK GOP Katowice. The module enables comprehensive operation of price lists: from defining a new price list, consisting of individual items, via modifying the existing one, defining individual properties, to cancelling the indicated price list items.

Financial-accounting interface (INT.FK) – is a specification of procedures and functions allowing to transfer to the ŚKUP System the analytical transactions, performed by means of payments in the ŚKUP system, and all other data of financial and settlement nature.

Other transport organisers module MIOK – was implemented by the use of other applications functionalities. It enables building a hierarchical structure of organisations covered by the system.

Interface to the passenger information application – is used to exchange the information between the ŚKUP System and the Dynamic Passenger Information System (SDIP).

PWM application – is used for an independent change of passwords by users from KZK GOP and from other entities.

Mediation and collection application – the application for mediation and collection is used to gather the transaction, location, and operational data from the hardware, and to gather the transaction data from the portal and from POK/POP applications.



Ruda Śląska, stop Godula, Niepodległości square

mation is also favourable to operators working for KZK GOP. In the cases of reliable task performance the data provide a defence both for the driver and for the carrier company.

Summary

The system of Silesian Public Services Card is a really powerful and very useful tool in a daily work of the transport organiser. The system start, the data input to it, and finally the acquisition of the skill to efficiently use the generated data, substantially facilitate the work. In the field of transport services control section activity it allows a quick and efficient verification of a larger than before number of journeys, and even such their details, which formerly was not possible, but on the other hand it requires chang-

ing habits both of employees and of operators. Also it is worth emphasising that the actions undertaken are not aimed at discrediting the operators actions, and in numerous cases, when unjustified complaints occur, they are objective and indisputable arguments to defend the rightness of the driver or the operator.



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Demand service application – is used to make the system data and services available for the needs of the SAD, POS, UKP, ticket-inspector, park meters, and to transfer the data on events occurring in devices for the monitoring needs.

SOFTWARE OF REMOTE INFRASTRUCTURE HARDWARE

Software of vehicle on-board system – consists of software components of the vehicle on-board system, which include: a module of universal on-board computer UKP, switch SW16 software, a module for fares collection.

Module of universal on-board computer UKP – an on-board computer is a mobile device installed in the vehicle.

Module for fares collection – application made in two variants – installed in F3A and F240B validators (dual and single-system readers).

SAD module – software of stationary card recharging machine.

Park meters module – software of the park meter as a remote device and working with it components of the central part.

Module to collect charges/recharge cards – the main part of the module is the application for charges collection and cards recharging terminal (UPOS), which is a mobile device intended to carry out operations with the use of cards. The list of functions available in specific UPOS Terminal is configurable and depends on the purpose of UPOS Terminal, resulting from the place of its use.

'Ticket-inspector' module – enables inspection of season tickets validity, of fares for single travels, of fares for additional travels (luggage, an additional person, an animal), activated on the SKUP card, purchased in the module for fares collection from the e-purse.