

## SMALL AIRCRAFT TRANSPORTATION SYSTEM IN POLAND – IDEA AND MODEL ASSUMPTIONS

Elżbieta Marciszewska<sup>1</sup>, Izabella Bergel<sup>2</sup>

The paper presents the idea of small aircraft transportation system in Poland based on research being done within a grant of Institute of Aviation along with Warsaw School of Economics and Warsaw Institute of Technology. The final aim of this system is to provide a fast means of transport to all Polish regions, especially the provision of business trips to/from any region in Poland within one day at the cost comparable to travelling by car. Within the research on SATS there was a series of investigation on intra-regional mobility, passenger flows estimation based on income distribution, time value and intra-regional mobility statistical database. Direct research (questionnaire) involved three regions, 900 respondents (households and companies). Data gathered on intra-regional mobility is a basis for modelling the demand for SATS services, including formulation of transportation task, selection of aircraft and system workings. In the final phase of research an attempt will be made at working out a comprehensive idea of SATS workings in Poland along with flight and fleet management system, flight scheduling and service marketing. It is also assumed that SATS Data Collecting and Management System (System Wide Information Management) will be established within SESAR programme by 2020. During the research on SATS in Poland research and studies carried out within EPATS (European Personal Air Transportation System) project were used. These were a part of the Sixth Framework Programme of the EU.

**Key words:** Small Aircraft Transportation System, intra-regional flows, model assumptions

### 1 Introduction

The strategy of transport development Publisher In the White Paper by European Commission clearly underlines the need to reconcile economic and development targets with environmental protection and the concern to preserve natural resources. A reasonable way to reconcile these target is the concept of sustainable development of transport.

- It ensures the accessibility of communications targets that is safe for the environment and people of the current and next generations.
- It enables effective functioning and offers choices of the means of transport.
- It supports economic development of the country and the regions.

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<sup>1</sup> Prof. dr hab. Elżbieta Marciszewska, Warsaw School of Economics, Departament of Transport, 02-554 Warsaw, Al.Niepodległości 162, Poland, tel. +48 22 564 93 14, E-mail: emarci@sgh.waw.pl

<sup>2</sup> Dr Izabella Bergel, Warsaw School of Economics, Departament of Transport, 02-554 Warsaw, Al.Niepodległości 162, Poland, tel. +48 22 564 93 14, E-mail: iberge@sgh.waw.pl

- It reduces the negative influence on the environment, especially related to non-renewable resources and using their substitutes instead.

Thus a number of measures and research is undertaken to ensure the assumed target is reached as far as sustainable development of transport is concerned, including particular regions, countries, the whole EU as well as the global transport system.

On February 4, 2009 the European Parliament passed a resolution on a road map for stable future of general and corporate aviation. It obliges the European Commission to undertake research on general aviation within the 7th Framework Programme. These measures are compatible with the current research on the introduction of small aircraft transportation system.

## 2 The concept of STMS in Poland

The idea of small aircraft transportation system in Poland is based on the concepts developed in the United States (SATS Programme) as well as the EPATS (European Personal Air Transportation System) project. Both systems are based on small aircraft used in mid-range passenger flights. However, a number of differences can be pointed out between these concepts. The main target of SATS are business travellers that used legacy carriers' services so far to fly between the destinations served, i.e. mainly big cities. As far as SATS is concerned the services will be based upon 4-7-seat piston or jet aircraft flying between both large and small airports. It is assumed that the majority of aircraft will be privately owned. On the other hand, EPATS is to be a public system so that the whole society can use it. The system is believed to increase the mobility of the society through the increase in accessibility to a fast means of transport. At the same time, it is assumed that one of the largest groups of clients will be business travellers. Within EPATS two segments can be distinguished. The first one is on-demand services and air-taxis. In this segment 4-7-seat piston and turbo-prop aircraft will be operated. The target customers within this segment will be business travellers. Services offered within the second segment will have wider market, a part of which will be non-business travellers. These services will be operated as inter-regional scheduled flights operated by 9-19-seat turbo-prop aircraft. The connections are to be established between regions with low passenger flows, where regular rail services or flights operated by legacy carriers would be unprofitable. At the moment the majority of passenger flows on these routes is done by private cars. It is expected that much different than in the case of SATS, EPATS flights will be between local and small regional airports. The small aircraft transportation system in Poland (STMS) will be similar to EPATS and will also be a public system.

According to STMS requirements the system will be complementary to the existing air transportation system based upon scheduled flights between regional airports (mainly to Warsaw) and on general aviation in case of which also smaller local airports are used. However, these services are not widely available and are provided on the on-demand basis (so called air-taxi). Moreover, it is expected that with such services becoming more common and available the costs (and prices, as a consequence) of passenger-kilometre should be lower. Currently high prices of air-taxis are a result of low market saturation in Poland and the fact that the aircraft are often based outside the airport of origin. The additional problem is low passenger load factor in general aviation in Poland. On average there are only slightly above 2 passengers per flight regardless of the capacity of the aircraft.

It should be noted that the introduction of STMS will have a positive impact on local communities and societies. Even now people in many parts of Poland are deprived of a fast<sup>1</sup> access to regional airports. STMS gives an opportunity to increase the transport accessibility in these region based upon regional and local airports.

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<sup>1</sup> In case of some regions in northern and eastern Poland it takes more than two hours to get to the nearest regional airport.

The role of air transport is highly correlated with the increase in time value that is especially precious in business trips. An attempt was taken to develop an air transport system, including local and smaller regional airports from which 6-19-seat aircraft (air-taxi) would operate. The research „Small Aircraft Transportation System – analyses and studies – STMS” is an undertaking of the Institute of Aviation in cooperation with the Warsaw School of Economics and Warsaw University of Technology financed by the State Committee for Scientific Research. As mentioned above, similar projects were developed within ESPON and EPATS research programmes with regards to the European market and included the development of transport models and programming the requirements of Interactive Small Aircraft Transportation System. A similar system was developed for the US market as well. SATS (Small Aircraft Transportation System) is based upon small aircraft (up to 10 passengers) operating between the existing airports<sup>1</sup>. The United States has the highest spatial saturation with airport infrastructure with over 5400 small airports and ca. 18 thousand airport infrastructure facilities. Over 93 per cent of the US population have an airport within an easy reach (up to 30 minutes car ride). The main assumption of SATS is the reduction of travel time by ca. 50 per cent in 10 years and 70 per cent in 25 years. The costs of travel should be comparable to those by car (10—15 per cent higher). According to US estimations the development of SATS will stimulate the development of the regions as one small aircraft will generate ca. 10 jobs.

The aim STMS in Poland is to provide a fast means of transport to all Polish regions, especially the provision of return business trips to/from any region in Poland within one day at the cost comparable to travelling by car.

Basic airport requirements to be applied in STMS will be determined in the STMS R&D project as well.

The STMS project assumes that within next 10 years each voivodship (out of 16 in total) (NUTS-2 region with over 800 thousand inhabitants) will have at least one small airport serving small passenger flows under 100 thousand passengers p.a. In the next 10 years each subregion (out of 46 in total) (NUTS 3 - 150—800 inhabitants) will have such an airport. Currently there are between 120 and 140 airports and airstrips in Poland, depending on sources. According to the Civil Aviation Office there are 53 civil airports in the airport registry (including 12 licensed ones) and 39 recorded airstrips. So in each and every voivodship there is infrastructure that can be used in STMS flights. In the long-run the construction of new airports and airstrips should be considered to serve STMS-based air transport.

STMS will be based on local airports, especially in the regions with poorly developed road and railway infrastructure making fast and safe travel impossible. The project assumes that STMS will serve both business and non-business travellers.

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<sup>1</sup> To learn more on SATS see: A. Jaroszewicz, W. Wróblewski: *System transportu małymi samolotami. W: Infrastruktura Transportowa – szansa i barierą rozwoju regionalnego*. Wyd. Uczelniane WSG, Bydgoszcz 2008

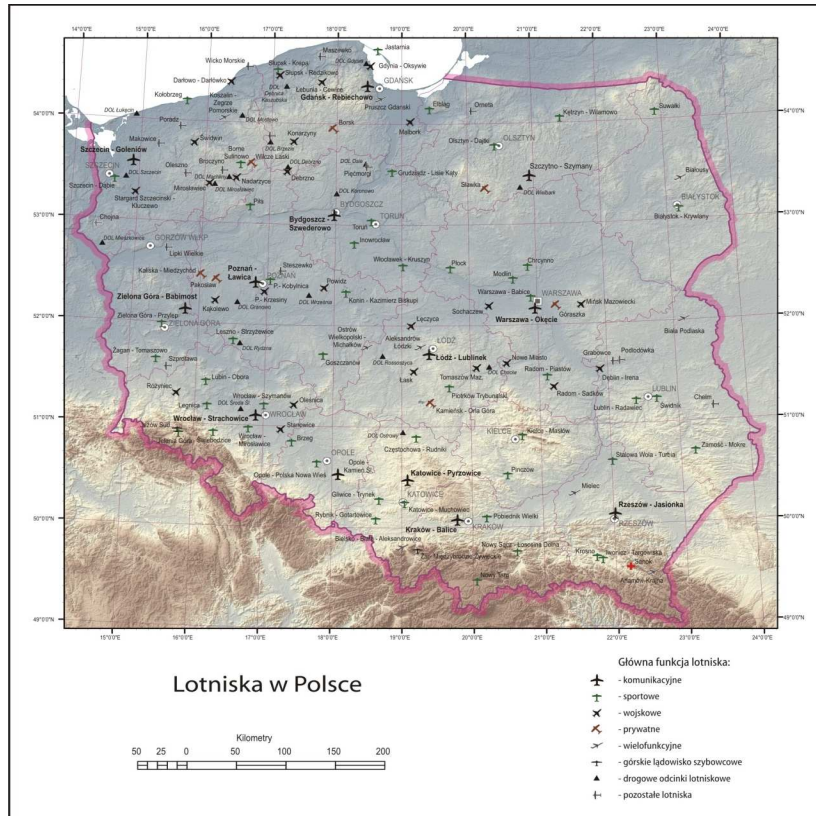


Figure 1. Airports in Poland.  
Source: Wikipedia

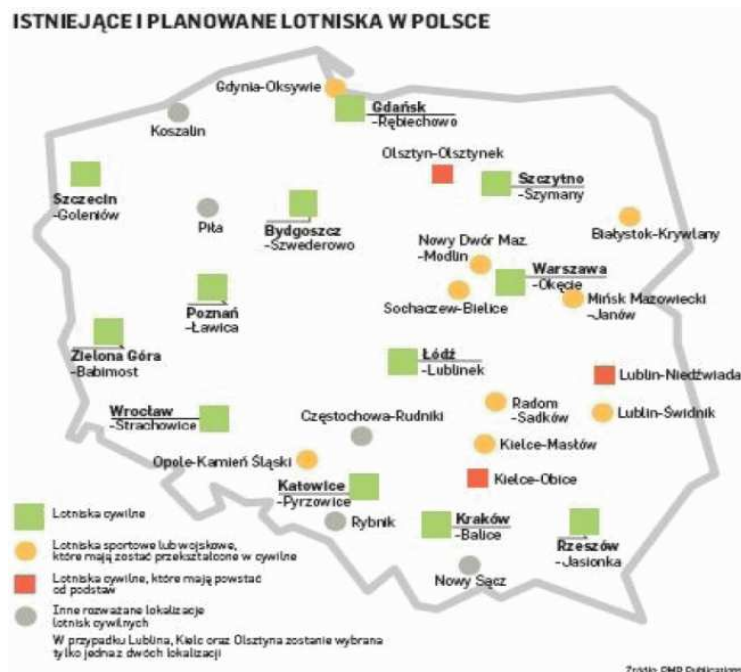


Figure 2. Existing and planned airports in Poland.  
Source: PMR Publications 2008.

An important aspect of the development of local airports are their communication linkages with their catchment area. Usually these airports are located outside the cities and the access transport is poorly developed with taxis and private cars being the most common means of transport there. In many regions where regional airports operate projects of local airports are developed to relieve these airports from some part of air traffic. These airports would facilitate traffic segmentation (charter flights, low-cost flights, cargo traffic, general aviation). The development of local airports, i.e. modernization and expansion of sports and service airports as well as former military airports in order to be used in air transport within STMS will depend upon local authorities. New regulations in Poland enable faster and more effective use for communications purposes of the airport infrastructure, including many military airports.

At the stage of project works within STMS grant an extensive research was carried out in order to identify passenger flows in private cars that could be shifted to STMS. The research included the analysis of demographic and socio-economic development of regions, and then determining passenger flows between regions, the structure of the flows as a function of time, income and distance. Next research involved transport infrastructure and means of transport, comparative analysis of technical and working parameters as well as eco-friendly means of passenger transport, fees for public long-distance transport usage and comprehensive costs of business trips depending on different means of transport. Moreover, models of operating costs of aircraft and car were built and general requirements for STMS aircraft were determined as well as basic requirements for STMS airports. In the last stage of research and project works a transportation task and the criteria of the selection of mode of transport were determined. As a result the demand for aircraft to serve STMS was determined based upon chosen regions. To ensure proper functioning of STMS an Air Traffic Management and Control System was developed based upon SESAR programme. As a result of this grant a „Concept of Functioning of Small Aircraft Transportation System in Poland” was developed, being a comprehensive model of the system. The STMS research project addressed all problems of the creation and functioning of such a system in Poland. The most difficult task was to determine inter-regional passenger flows in road transport (by private cars) that could potentially be shifted to STMS. A direct research was carried out (CATI method) on a representative sample.

The results and experiences of the Polish research team can be useful for other countries, where attempts to develop a similar air transport system operating small aircraft between local and regional airports are made.

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