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## APPLICATION OF BAGGAGE IMPROVEMENT PROGRAM IN UKRAINE

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**Abstract.** This article discusses the fundamental design difficulties of the fully automated baggage system, and their implications for airport and airline management. Theory, industrial experience, and the reality at Ukrainian Kiev Boryspil Airport emphasize the difficulty of achieving acceptable standards of performance when novel, complex systems are operating near capacity.

**Keywords:** IATA, baggage improvement program, airport, baggage handling system, société internationale de télécommunications aéronautiques.

### Introduction

Boryspil International Airport State Enterprise is the busiest airport in Ukraine providing around 65 % of passenger air traffic of Ukraine and handling over 8 million passengers per year.

Boryspil airport is conveniently situated at the intersection of many air routes connecting Asia with Europe and America. Around 50 national and international airlines operate regular flights carrying passengers and cargo to over 100 destinations worldwide.

The airport has two parallel runways and three passenger terminals. Technical possibilities of the airfield of Boryspil Airport are unique for Ukraine, CIS countries and Eastern Europe. Runway – 1 4000 m long and 60 m wide enables to accept all types of aircrafts non-stop in any weather conditions including low visibility. Boryspil is also the only airport in Ukraine transcontinental flights are operated from.

In June 2012 the brand-new contemporary passenger Terminal D was opened at the airport. It is the biggest and the most sophisticated passenger terminal complex in Ukraine. Boryspil airport has become the first Ukrainian operator providing the full set of handling services.

With the overall growth of airport, more passengers are able to try out services of air transportation from that

point of Ukraine. At the same time more baggage is to be handled. How to manage the nowadays' biggest problem of airport?

First of all, we should point out the general path of baggage cycle while being at the airport terminal.

Any luggage (including carry-on bags) must be presented to check-in staff or airline personnel upon request. Luggage accepted by an airline for carriage will be marked with a luggage tag, the check-in agent will then provide passenger with a second luggage tag which is to be retained by him for identification of his baggage at the destination airport/in case of loss of luggage.

It is advisable for passengers to lock their bags and secure them before check-in. Valuable items such as important documents, medicines or jewelers should be packed in the carry-on luggage and declared as required.

The norms of luggage carriage are established by each airline individually. If passenger has an excess baggage he should contact Airline directly to confirm regulations and fees. For provision of safety of baggage, an every Aviation Company recommends:

- To use for the trip a good-quality suitcases with firm locks;
- When using suitcases or bags made of cloth it is recommended to use padlocks for fixation of

zip-fasteners, lacings or straps for roping up the baggage with the aim to make it difficult for strangers to access the contents;

- To remove old tags after each flight;
- To use name tags from the outside of the baggage;
- With the aim of visual identification of baggage, to mark it with a strap or other individual mark.

### **Problem statement**

Every year airport customers check-in approximately 50 million bags, each of which receives a baggage label, is assigned to the relevant flight by airport baggage handlers and is loaded into an aircraft's cargo hold.

Certain events, such as adverse weather conditions, technical problems with baggage handling or a baggage label being torn off, can potentially lead to items of baggage being damaged or not arriving at the destination airport at the same time as the passenger.

The tens of thousands of bags flowing through Ukraine's airports during Euro 2012 were a source of stress for organizers, but a gold mine for unscrupulous handlers looking to take advantage of unsuspecting fans. Kyiv Boryspil Airport – which will handle the largest number of passengers – has a bad reputation for its luggage theft problems.

Boryspil officials claim the theft rate at the airport is one of the lowest in the world and is decreasing, with only 75 reported in 2011.

But critics complain that the luggage-transport system at the airport offers too many opportunities for theft and say that many instances are simply not reported.

The entire staff of the police department at Boryspil, which is directly responsible for the investigations of thefts, was replaced twice in the past two years because of suspicions that they were covering the thefts, according to Andrew Guck, a Ukrainian lawyer consulting several international airline companies including British Airways, Austrian Airlines and Alitalia.

The claims are usually about jewelry or something similar. Airport doesn't pay compensation for that, as it does usually about the things management strongly recommend not putting into the luggage.

But nevertheless, the whole system of moving the bag through the airport needs changing.

Airports tend to use their influence on airlines' business to prevent conflicts about the thefts. So even if the company can prove the theft was committed by air-

port workers, the airlines often won't demand any compensation because it is too important to maintain good relations with the airport.

There was a request that Mr. Guck, the lawyer, made to Boryspil police led to them blaming the airline for not installing cameras onboard to watch the loading of bags. That, they insisted, was the reason that theft took place.

If a bag is lost, passengers can demand compensation from the airline. This can be weight based, at \$20–25 for each kilogram of the lost bag, or the passenger can support a larger claim with evidence. The maximum amount of compensation is set by the airline. At Windrose, it is \$1,500.

But often passengers overprice their bags and stuff on purpose, like claiming that a regular bag costs 8,000 UAH or so. That may cause a refusal. It is not widely known, but the labels that are put on bags at the airport can tell something about its type and even the fabric it's made of. Airlines use that information, too, to evaluate the bag.

In 2011, Windrose received 553 claims of luggage missing, 18 of which were never found.

In cases when luggage is delivered with delay, the airline compensates for the purchase of emergency supplies.

Boryspil usually has problems with mishandling bags in summer when the flow of passengers increases.

Airlines' and airports' management usually very much regret this and take all necessary measures to reunite passenger with his baggage as quickly as possible or to compensate for the damage to the bag. But negative emotions from such an event lasts for a long time, so passenger will more likely use another mean of transport just to control his baggage. This is the leakage from airport's and airline's funds.

Recent researches and publications analysis

This article discusses the fundamental design difficulties of the fully automated baggage system, and their implications for airport and airline management. Theory, industrial experience, and the reality at Ukrainian Kiev Boryspil Airport emphasize the difficulty of achieving acceptable standards of performance when novel, complex systems are operating near capacity. This problem is being considered in the works of Jean-Paul Dr. Richard de Neufville, Gyrych V.Yu., Jervis B. Webb, etc. [1–6]. They are investigating the baggage handling process but are not examining the possible ways of improvements provision. The problem is being solved in terms of active ways of cameras installation and financial investments

which also should be reasonable enough to produce a coordinated and harmonized process of baggage handling.

A baggage handling system (BHS) is a type of conveyor system installed in airports that transports checked luggage from ticket counters to areas where the bags can be loaded onto airplanes. A BHS also transports checked baggage coming from airplanes to baggage claims or to an area where the bag can be loaded onto another airplane.

Although the primary function of a BHS is the transportation of bags, a typical BHS will serve other functions involved in making sure that a bag gets to the correct location in the airport. The process of identifying a bag, and the information associated with it, to make a decision on where the bag should be directed within the system is known as sortation.

In addition to sortation, a BHS may also perform the following functions:

- Load balancing (to evenly distribute bag volume between conveyor sub-systems);
- Bag counting;
- Bag tracking;
- Detection of bag jams;
- Volume regulation (to ensure that input points are controlled to avoid overloading system);
- Redirection of bags via pusher or diverter.

There is an entire process that the BHS controls. From the moment the bag is set on the in-bound conveyor, to the gathering conveyor, through sorting until it arrives at the designated aircraft and onto the baggage carousel after the flight, the BHS has control over the bag.

Many baggage handling systems offer software to better manage the system. There has also been a breakthrough with "mobile" BHS software where managers of the system can check and correct problems from their mobile phone.

Each airport has its own requirements. For instance, the time allotted for a bag to make it from the check-in area to the gate is determined by how fast a passenger can make the same trip. In some airports, it might only be a short walk to the passenger terminal, while in others, passengers might have to take a train.

For instance, the Denver International Airport, USA, has a modern, automated baggage-handling system designed by BAE Automated Systems, Inc. This system incorporates some amazing technology to move bags

from the check-in counter to the departure gate in an almost completely automated way:

Destination-coded vehicles (DCVs), unmanned carts propelled by linear induction motors mounted to the tracks, can load and unload bags without stopping.

Automatic scanners scan the labels on the luggage.

Conveyors equipped with junctions and sorting machines automatically route the bags to the gate.

### **Baggage Improvement Program (BIP)**

In 2007, 18,99 bags in a 1000 passengers were being mishandled. According to the 2012 SITA Baggage Report mishandling has been reduced to 8.99 bags in a 1000 passengers.

IATA's Baggage Improvement Program (BIP) has certainly contributed to reduce worldwide mishandling. BIP took place from 2008 to the end of 2012.

A total of 80 hub airports were visited for a week long one to one diagnosis.

A total of 120 airports participated in the Self-Help program.

BIP activities were driven by member airlines and provided the industry with solutions that addressed all causes of baggage mishandling.

Throughout BIP airlines and airports gained insight and knowledge about their baggage operations and it is important that this remains available to the industry when BIP closes.

According to the report 2010, mishandled bags were down 24% globally in 2009, saving the air transport industry (ATI) US\$ 460 million compared to 2008.

In 2009, the ATI reported just over 25 million mishandled bags globally. This is down 23.8% (7.8 million bags) from 2008, and down more than 40% (17,4 million bags) from 2007.

The improvement saved the industry US\$ 460 million year on year. Three main factors contributed:

- fewer people travelling;
- fewer people checking in bags in attempt to avoid fees;
- improvements in baggage handling systems.

Nonetheless, lost and mishandled baggage cost the ATI around US\$ 2,5 billion in 2009. This is a sum the industry can't afford to lose in the current economic climate. The International Air Transport Agency (IATA) estimated total airline losses of US\$ 9,4 billion in 2009, after losses of US\$ 16,8 billion in 2008.

Basically, it is difficult to compare such countries as USA and Ukraine, but it is indeed possible to make a brief calculation of how the program can contribute to the passenger processing activities.

Let us set up the starting point: 18,99 bags in a 1000 passengers were being mishandled. If we will assume that the data above was taken after the weekly diagnosis of 80 hub airports in 2007, we can surely state that technologies used in those airports were much more better comparing to technologies used in baggage handling equipment in Boryspil Airport (excluding technologies used in Terminal D), so the number of mishandled bags should be increased by 40 % – 26,6 bags for terminals B and F, and approximately 8,99 bags for terminal D, as it the new terminal with new equipment.

The annual passenger turnover in Boryspil Airport is 8mln passengers, while the average number of processed passengers in hubs is 57 mln. passengers per year. It is seven times less.

But what is the theoretically-practical airport capacity in terms of passenger turnover? There are already estimated numbers of passengers processed for each separate terminal: for B – 1 200 pass/h, for F – 1 500 pass/h, and for D – 3000 pass/h. After brief calculations based on 24-hour operation, excluding 4 dead-hours (from 1 a.m. till 5 a.m.), and on 60 % of flight occupation, we defined the next annual amounts of passengers per each terminal: for B: 5,2 mln., for F: 6.5 mln., for D: 13,6 mln., and total – 25,3 mln. passengers. This number is the prospective number of processed passengers.

KBP passengers can enjoy fully automated baggage handling system only in Terminal D, so our forecasting calculations of mishandled bags will look next way:

$$N_{B\&F} = \frac{26,6 \times 11,7}{1000} = 311220, \quad (1)$$

where  $N_{B\&F}$  – bags mishandled annually at the terminals B and F.

$$N_D = \frac{8,99 \times 13,6}{1000} = 122264, \quad (2)$$

where  $N_D$  – bags mishandled annually at the terminal D.

So, there are 433 484 bags mishandled at Kyiv Boryspil Airport totally per 1 year of operation. It is an enormous indicator, so the usage of BIP will contribute to the better passenger service. According to the data above, the average percentage of mishandling decreases on 25 %, so on the example of KBP we will receive 325 113 bags with improper processing per year. More than 0,1 mln. bags would be delivered in time and undamaged.

It is a very good index for airport operations improvement and new clientele attraction.

### Baggage trends

Baggage self-service is coming to a kiosk next to passenger. Over the past year, adoption of self-service facilities has grown by 20 % (2009 SITA / ATW Passenger Self-Service Survey). Among passengers who do not use self-service check-in options, baggage remains the number one obstacle – 30 % cite baggage check-in as the main reason for avoiding self-service options; over 75% have never printed a bag tag from a kiosk.

56,9 % don't see the value of self-service check-in if they have to go to an agent desk to drop their bags

36,7 % don't think it's possible to use self-service check-in when they have bags to check

28,1 % find it “too complicated” to use self-service check-in when they have bags to check

17 % believe using self-service check-in increased the risks of not receiving their bags when they arrive at their destination

Despite the current obstacles, self-service is well positioned for future growth. Over 50 % of respondents to last year's Passenger Self-Service Survey said they wanted more self-service options. 60 % said they would either frequently or intermittently use remote check-in and baggage drop-off services in the future. 48 % said they would use kiosks to report lost baggage.

This is good news for the ATI, which plans to introduce a number of self-service baggage options in the next two years.

While the industry continues to encourage passengers to travel with fewer bags, many European and North American carriers continue to benefit from ancillary revenues related to baggage charges. According to AirlineForecasts, airlines collected US\$ 2,47 billion in baggage fees globally in the 12-month period ending September 2009.

Checked baggage is now the major ancillary revenue associated with aircraft operations, generating much more revenue than pre-reserved seating and early boarding (but still substantially less than frequent flyer programmes).

There's no doubt such charges have impacted passenger behavior. The proportion of passengers checking baggage has dropped from 82 % in 2007 and 2008 to 76 % in 2009 (Passenger Self-Service Survey).

Mishandled baggage vs. checked baggage fees is a balancing act for airlines. Some airlines have foregone

charging for checked bags, while others offer refunds and/or frequent flyer miles to passengers whose bags don't arrive at the carousel in a timely manner.

With 88 % of all travelers and 93 % of business travelers carrying a mobile phone, it's no surprise that mobile services are poised to become a channel of choice for passenger services, complementing the existing self-service options, such as self-service kiosks to report missing bags.

Some airlines and airports communicate via SMS messages to passengers whose bags have not arrived with their flight, and continue to provide regular SMS updates until their bags arrive on the passengers' doorstep.

This is good news, particularly for airlines, who have shown a strong ambition to increase the adoption and availability of mobile services for passengers.

IATA's Baggage Improvement Programme (BIP) proposes solutions that aim to cut baggage mishandling in half by 2012. This would generate savings to the ATI of US\$ 1 billion to US\$ 1,9 billion, depending on the number of issues each BIP participant decides to address.

After eight pilots in 2008, the BIP team launched the programme in 2009 with 25 airport diagnostic visits. The airports represent approximately 28 % of all mishandling files. To date, BIP solutions have addressed an average of 90 % of the mishandling causes identified at these airports, proving the programme's methodology and its solutions toolkit.

The Baggage Report 2010 contains more information on BIP, including a case study from Charles de Gaulle Terminal 2 with the support of Air France.

Since 2005, SITA has produced an annual baggage report, which is designed to offer the ATI stakeholders the latest facts, figures and trends related to global baggage processing and management. In preparing this report, SITA works in close collaboration with industry partners – including IATA – to ensure its facts, figures and analysis are as complete and accurate as possible. With help from these essential insights, ATI stakeholders can work together to improve baggage management around the world – generating savings for the industry, while improving the overall passenger experience.

## Conclusions

According to the data perceived from the worldwide research, it is very easy to make a conclusion that application of this program in Ukraine will lead to some improvements in baggage handling process. But at the same

time such means will cost a lot, so for even partial use of BIP the extra funds are needed.

Development of the main airport of the country evidences the positive dynamic process in aviation industry. It enhances its infrastructure, attract new airlines, and improve quality of service.

There are approximately 433 484 bags mishandled at Kyiv Boryspil Airport totally per 1 year of operation. In such a way the usage of BIP will contribute to the lower risk of mishandling operations and as a consequence – higher level of passenger service. According to the data above, the average percentage of mishandling decreases on 25 %, so on the example of KBP we will receive 325 113 bags with improper processing per year. More than 0,1 mln. bags would be delivered in time and undamaged. It is a very good index for airport operations improvement and new clientele attraction.

## References

- Gyrych V. Yu. 2009. Investigation of modern tendencies in designing of air cargo terminals in Ukrainians' airports. Polit – 2009. *Modern Problems of Science: IX international scientific–technical conference of students and junior scientists*. 327 p.
- Dr. Neufville, R. de. 1994 The Baggage System at Denver: Prospects and Lessons. *Journal of Air Transport Management*. Vol. 1, No. 4: 229–236.
- Gyrych V. Yu. 2009. Design diversities of cargo storage systems' of airport cargo terminal. *Avia – 2009: IX international scientific–technical conference of students and junior scientists*. # 3: 19.12–19.15 pp.
- Gyrych V. Yu. 2008. Experience analysis of airport cargo terminal design in CIS countries. *Ukrainian Building*. # 8: 15–18 pp.
- Jervis B. Webb. 2011. *BHS*. 8 p.