MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
NATIONAL AVIATION UNIVERSITY

Air Transportation Management Department

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QUALIFICATION PAPER
(EXPLANATORY NOTES)

Theme: «Ground handling system at airports»

Done by: Kristina A. Turchyna

Supervisor: Victoria Ye. Akmaldinova, Senior Lecturer

Standards Inspector: Yuliia V. Shevchenko, PhD, Associate professor

Kyiv 2022

Міністерство освіти і науки України
НАЦІОНАЛЬНИЙ АВІАЦІЙНИЙ УНІВЕРСИТЕТ

Кафедра організації авіаційних перевезень

ДОПУСТИТИ ДО ЗАХИСТУ
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«_____»_____2022 р.

КВАЛІФІКАЦІЙНА РОБОТА
(ПОЯСНЮВАЛЬНА ЗАПИСКА)

ВИПУСКНИКА ОСВІТНЬОГО СТУПЕНЯ «БАКАЛАВР»

Тема: «Система наземного обслуговування в аеропортах»

Виконавець: Турчина Крістіна Андріївна

Керівник: Акмалдінова Вікторія Євгенівна

Нормоконтролер: к.е.н., доцент Шевченко Юлія Вікторівна

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NATIONAL AVIATION UNIVERSITY

Faculty of transport, management and logistics

Air Transportation Management Department

Major (specialty): 275 “Air Transport Technologies”

APPROVED BY
Head of the Department
_____ D.O. SHEVCHUK
“_____”_____2022

TASK

of completion the qualification paper

Kristina A. Turchyna

1. Theme of the qualification paper entitled: “Ground handling system at airports” was approved by a decree of the Rector order №436/ст. of April 27, 2022.
2. Term performance of qualification paper is 16.05.2022 – 19.06.2022.
3. Initial data required for writing the qualification paper: statistical data and analytical materials on production and financial activities of the Igor Sikorsky Kyiv Municipal Enterprise (Zhulyany).
4. Content of explanatory note to the qualification paper: Analysis of ground handling technology in the Igor Sikorsky Kyiv Municipal Enterprise (Zhulyany). Research of passenger service technologies by the passenger service at the airport. Analysis of traffic volumes and financial indicators of the Igor Sikorsky Kyiv Municipal Enterprise (Zhulyany).
5. List of mandatory graphic matters: production and financial indicators of activity and their dynamics in KP IA "Kyiv named after Igor Sikorsky" ("Zhulyany").

6. Planning calendar

№	Assignment	Deadline for completion	Mark on completion
1.	Collection and processing of statistical data	16.05.2022 – 22.05.2022	done
2.	Writing of the analytical part	23.05.2022 - 29.05.2022	done
3.	Writing of the design part	30.05.2022 – 06.06.2022	done
4.	Writing of the introduction and summary	06.06.2022	done
5.	Execution of the explanatory note, graphic matters and the presentation	07.06.2022 – 11.06.2022	done

7. Given date of the task: May 16, 2022.

Supervisor of the bachelor thesis: Victoria Ye. Akmaldinova

Task was accepted for completion: Kristina A. Turchyna

EXPLANATORY NOTE

The explanatory note for the bachelor thesis entitled “Ground handling system at airports” comprises of 38 pages, 3 figures, 4 tables and 25 references.

KEYWORDS: AIRPORT, AIRPORT SERVICES, QUALITY, METHODS, INNOVATIVE TECHNOLOGIES, ROBOT GUIDES.

The object of the research is the terminal complex A, Zhulyany International Airport.

The subject of research is the process of managing the quality of airport services.

The aim of the research is to to develop methods of quality assessment of services in the sphere of airport activity, which allows the airport to form and increase its competitive advantage in the international air market, to function effectively and increase market share by means of improvement of level.

Research methods: methods of expert evaluations, comparative analysis, statistical comparisons and theory of operations research.

The analytical part of the work consists of a production and financial activity and competitive advantages of the airport "Zhulyany" has been carried out.

In the design part, the project proposals on improvement of passenger service were developed, due to introduction of assistants in the terminal of airport "Zhulyany".

CONTENTS

LIST OF ABBREVIATIONS

ACI - Airports Council International;

ATAG - Air Transport Action Group;

ATM - Automated teller machine;

ATS - Air Transport System;

BLND – a blind passenger;

CHD – a child;

COVID-19 – Corona Virus Disease 2019;

CUSS - Common Service Self Service;

DCS - Departure Control System;

DEAF – a deaf passenger;

DEPO – a deported passenger;

ECAC - European Civil Aviation Conference;

EU -European Union;

FAA - Federal Aviation Administration;

FREMEC - frequent travelers medical card;

GDP -Gross domestic product;

IATA - The International Air Transport Association;

ICAO - International Civil Aviation Organizations;

INAD - inadmissible passengers;

INCAD - incapacitated passengers handling advice;

INF – an infant;

MCI - Mobile check-in;

MEDA - patients who may require a medical examination;

PFS - Passenger Final Sales;

PNL - Passenger Name List;

SOP - Standard Operating Procedures;

SOPGP – Mail and Freight Service;

SOPP - Passenger Transportation Service;

SST - Self Service Terminal;

STCR - sick passengers on a stretcher;

SWOT - strategic planning;

uaAAA - rating scale;

UATA - Ukrainian Aviation Transport Association;

UIA - Ukraine International Airlines;

UM - Unaccompanied Minor;

WCHC- the passenger is completely unable to move independently;

WCHR - wheelchair is required on the platform;

WCHS - a passenger cannot climb.

INTRODUCTION

Air Transportation Management Department				NAU 20.03.38 001 EN			
Done by:	Kristina A. Turchyna			INTRODUCTION	Letter	Sheet.	Sheets
Supervisor:	Victoria Ye. Akmaldinova				D	9	2
Standards Inspector	Yuliia V. Shevchenko				FTML 275.403a		
Head of the Department	Dmytro O. Shevchuk						

At present, one of the main characteristics of a successful airport is the quality of services that meet the expectations, needs and capabilities of passengers and, as a result, retain advantages over competitors.

Airports are enterprises that perform public service functions and the quality of service is a priority area of their activity. At present, it is necessary to analyze the quality of the airport services provided and to outline ways of their improvement. Today, the success of those enterprises that give priority to quality.

The main task is to provide the best service according to the client's needs according to international standards. Achieving quality of service means meeting the expectations and needs of air carriers and passengers.

Further investment attractiveness of the region, attraction of Ukrainian and foreign investors, realization of tourist potential of the country depends on quality of services provided to passengers, availability of developed and well-organized service system at airports.

The improvement of the quality of service of passengers at the airport can be achieved by introducing innovative technologies into the already existing system of passenger service.

The main purpose of introduction of new technologies in airport activity is creation of new goods (services) or goods (services) with new qualities.

The means of innovative activity can be the production and experimental base, material, financial resources, airport personnel.

The strategic goals of improving the quality of service of passengers at the airport, using the latest technologies can be:

- improving the competitiveness of the airport on the international market;
- attracting new airlines and passengers;
- increase of capacity and increase of passenger traffic and cargo flow;
- meeting the needs of consumers at the level of international quality standards;

- increase of the company's profit due to increase of the airport fees for passenger services.

The general property of these goals is their exceptional relevance and necessity for the further existence of the enterprise.

Certainly, any airport is in the conditions of competitive struggle. The realization of the enterprise that it is in a competitive environment will immediately lead to an understanding that the quality of service is one of the main elements in the management system, and the correct assessment of the real state of the quality of services - the main element on the way of increase of efficiency of the enterprise functioning.

Implementation of the concept of formation of a system of quality of service for passengers due to innovative technologies allows airports as service enterprises to raise the quality level of services provided by them, attractiveness for business partners and consumers of the offered services, overall rating of competitiveness, and thus efficiency of use of available resources, which is found in the positive dynamics of the main results indicators of the activity of economic entities.

The aim of the work is to develop methods of servicing passengers at the airport, which will lead to the increase of competitiveness of the airport on the international market, due to introduction of innovative technologies in the system of servicing passengers at the airport terminal.

1. ANALYTICAL PART

Air Transportation Management Department				NAU 20.02.96. 100 EN				
Done by:	Kristina A. Turchyna			**1. Analytical part**	Letter		Sheet.	Sheets
Supervisor:	Victoria Ye. Akmaldinova					D	12	9
Standards Inspector	Yuliia V. Shevchenko				FTML 275.403a			
Head of the Department	Dmytro O. Shevchuk							

1.1 Airport as Service Enterprise

1.1. Existing methods of assessing the quality of service of passengers at airports

The purpose of any airport is to provide passengers, airlines and other companies that cooperate with the airport with quality and timely services of both aviation and non-aviation nature. Main types of airport activity and services:

- landing and departure of aircraft;
- service of air carriers, passengers (landing, departure) and enterprises that can work at the airport;
- handling (receiving, sending) of baggage, mail and cargo;
- use of the airfield, air terminal, post-cargo complexes, storage facilities and filling of fuel and lubricants;
- Technical and commercial servicing of the PS; operation of means of maintenance of technological processes in the zone of the airport heat, electricity, transport, etc.;
- implementation of environmental safety measures.

The main groups of the airport service consumers are airlines and passengers. Accordingly, they will assess the quality of services each of their positions. The main quality indicators of airport services are described in the Standard Service Level Agreement (SLA) developed by IATA. Quantitative and qualitative quality indicators are used. Quantitative indicators are the time of technological operations or the required space, the percentage of the equipment's integrity, etc. Quality indicators should usually be determined by the consumer (passenger) on a specified scale, for example, by six-point (table 1.1).

The main groups of quality indicators of the airport complex services for air carriers can be: Airdrome provision; orthological provision; ground service of the PS; airport service; organization of handling of cargo and mail; provision of the PMM; organization of maintenance of aircraft suitability; organization of mutual

settlements; stimulation of carrier flights; organization of service in crisis situations; regulatory regulation in the sphere of providing services at airports servicing; level of competition in providing services on airport and ground servicing (possibility of performing services by own forces).

Table 1.1

Scale of quality assessment of airport service

Assessment `points`	**Quality of service characteristics**
0	there are no services
1	the service is provided for the first time, the quality is unsatisfactory
2	the service is provided, the quality of the delivery is satisfactory, the tendency to deterioration
3	the service is provided, the quality of the delivery is satisfactory, the tendency to improve
4	the service is provided at the highest level
5	the service is provided at the highest level

Each of these groups can include from 1 to 10 single quality indicators (table 1.2).

The individual quality indicators are determined by the results of a survey of the respective target audience of consumers — passengers, representatives of airlines, airport services, aviation experts and experts, etc. The group quality indicator is defined as the arithmetic mean of the individual quality indicators that are part of the group. Criteria for assessing the quality of service and service of passengers at the airport can be ease of orientation at the airport, ease of movement, waiting time in queues, speed of baggage receipt, availability and convenience of ground transport, parking, simplicity and convenience of flight style, assistance to passengers and friendly staff of the airport, catering enterprises, cost of catering services, retail trade, the cost of retail services, wireless communication and

information services, availability and condition of toilets and shower rooms, equipment of waiting areas, passport and visa control for departure and arrival, simplicity of security procedures, time of inspection procedures, cleanliness of the terminal, atmosphere etc.

An example of the service quality assessment program offered by airports in different countries is the World Airport Customer satisfaction Survey of the influential British private consulting company Skytrax, which is aimed at studying the quality of services provided by different airlines and airports.

Table 1.2

Quality indicators of airport services

№	Name of the quality indicator
1	Possibility to perform ground-based services by own forces
1.1	Acceptance-release of aircraft
1.2	Internal cleaning of aircraft
1.3	Load handling
1.4	Catering (food, meals, snacks)
1.5	Fuel support
2	Airfield support
2.1	Conditions of the covering of the steering tracks, parking places
2.2	Proper marking
2.3	Organizations of work on parking places. Availability on stationary power sources, parking places equipped with centralized charging system, fire extinguishing,towing, ground equipment
3	Orthological support
3.1	Statistics on collision of aircraft with animals and birds at the airdrome and in the area of the airdrome due to unfavorable orthological circumstances

The following criteria are checked in ground handling system:

Efficiency of work of airport personnel; dimensions of queues at the passport control desks; speed of baggage delivery after arrival; availability of shops, cafes, restaurants, possibility of access to the Internet and other conveniences; business-halls, premises for official delegations; cleanliness of terminals etc.

Another example is the ASQ (Airport Service Quality) program, which is an initiative of the ACI International Airport Council. It is held in an independent, professional and neutral form and is recognized by the benchmark of the world's leading airports for passenger satisfaction. The method of assessment involves a quarterly assessment of 17 of their work with a set of 36 parameters.

1.2 Methodology and technology analysis of airport services quality

The growing demand on the air transportation market has led to new requirements for the quality management systems for passengers at airports. Given that the task of increasing the efficiency of the activity can stand before any airport regardless of the situation on the market, at present one of the most effective ways of solving these tasks is the orientation to improve the quality of services. The high level of airport service quality is conditioned by the efficiency of the airport operation, which is expressed in attraction of additional funds due to opening of new air routes, increase of capacity, expansion of the list of services provided, attraction to cooperation of new airlines, expansion of the route network and increase of the frequency of flights.

However, currently no centralized regulations regulating the quality of airport services, as well as the system of quality control of airport infrastructure services: The main regulatory authorities in the field of quality of airport services are standards of quality management system ISO 9001: 2008 and requirements to aviation security ISAGO.

IN. IN. Kubricek developed a methodology based on the development of questionnaires for airport infrastructure consumers - passengers - and time-based

cards for quality managers. The method provides for passenger evaluation of a number of indicators that characterize the level of information service at the airport, comfort of the airport terminal, quality of service at departure, quality of flight service, and commercial services. For quality managers In. IN. Kubricek has developed special cards on the basis of time-consuming methods, which represent the questionnaire, in which respondents are offered to specify quantitative results on the cult of the serviced passengers per unit of time, employed personnel, quantity of used equipment, length of turn, time of service, etc. e. The advantages of this method are rather thorough elaboration of criteria for assessing the quality of airport services, a convenient form of questionnaire for respondents. The disadvantage of the method is the lack of evaluation of the quality of airport services by airlines - direct consumers of services. The quality of service by managers by quality also appears rather ineffective, despite the developed objective criteria of evaluation - to assess the developed indicators in order to increase the objectivity of the results should an independent expert.

The passengers were allocated the following main factors, which influence the quality of service assessment: Waiting time for check-in; quality, availability and size of waiting room; speed of baggage receipt; availability of information displays; ease of orientation in the airport terminal. The lowest estimates of importance were such factors as presence of trade points in the terminal, availability of wireless Internet, phone and fax, availability of smoking rooms

The advantage of this method is to attract passengers to develop key indicators of airport service quality and to assess the satisfaction of the quality of services at a particular airport.

The Ukrainian Quality Association gives the following definition of "quality management" – these are the main directions of activity of the functions of general management, which define the policy in the field of quality, purpose and responsibility, and carry out them with the help of such means as quality planning, quality management, quality assurance and quality improvement within the quality system".

The high level of service quality of all consumer segments means satisfaction of their expectations and, at the same time, is a guarantee of long-term efficient operation and development of the airport complex and creation of competitive advantages on the air transportation market.

The method of assessing the quality of the airport complex services at the initial stage involves research of the main subjects of the airport complex services market: Consumers with the allocation of segment groups and producers to determine the responsible airport departments and services on the issues of the quality of services assessment.

Specialists of the airport quality service took part in the evaluation of quality alongside with the passengers and visitors. The choice of an additional source of information is due to the low efficiency of the survey of airport service consumers due to the low reliability of the received data and non-return of questionnaires by respondents. Passengers and visitors are generally not interested in the results of the survey and, in addition, rather unwillingly reveal data that allow to determine the representativeness of the sample (e.g. age, social status, income level, etc.). At the same time, the airport quality service employees are not only interested in the results of the research, but also have professional training in the field of quality. As noted above, the key groups of airport service consumers are two segments: B2B and B2C. In turn, the B2B segment is formed mainly by airlines, which bring a significant share of revenues from aviation activity. The B2B segment is represented mainly by passengers, who are the main source of income from non-aviation activity. As to the definition of the producers responsible for quality control, the list is based on the criteria of choice of the airport structure and duties of officials, who ensure the implementation of these criteria.

A number of indicators are used to assess the airport performance and compare with other airports, usually divided into several categories. Among them are the main ones: Passenger traffic, cargo transportation, passengers' departure (number of primary, transit and transfer passengers), which were flown from the airport flight in a unit of time, sending/arriving loads, sending flights, etc.

IA "Zhulyany" is the first state enterprise that managed to successfully transform its business model of management and in a rather small period of time turned out from inefficient and the loss on the effective and increased profit, one of the leaders in the growth rate in the European market. In 2015, IA "Zhulyany" introduced a new strategy, so-called "hub". It is aimed at finding additional transfer passengers from foreign countries because of low solvency many Ukrainian passengers. At the moment 20% of the total passengers traffic IA "Zhulyany" is transfer passengers. The cost of servicing one passenger was significantly reduced due to the increase in the number of additional passengers. Thus, this strategy led to a reduction in the cost the airport's services have also increased the attractiveness of the airport for airlines, multinational companies and certainly for passengers.

The main factors due to which air carriers and passengers prefer Zhulyany International Airport:

- competitive cost of services, provided by transparent "Regulations on the application of reduction factors to airport charges",

- attractive geographical position of Zhulyany International Airport, which is located in the center of Europe, and the company is one of the 30 best airports in Europe in the quality of connections according to ACI Europe 2018,

- the quality of services is at a high level and meets all standards of international organizations ICAO and IATA, so that in autumn 2018 the Airport entered the top 20 most punctual airports in Europe according to Flightstats, and in 2018 became one of the 3 leaders in the East Europe in quality according to the SkyTrax rating.

Consequences of quarantine, due to the COVID-19 pandemic, for Zhulyany International Airport

The coronavirus pandemic has led to flight restrictions. As a result, in April, the number of passenger flights worldwide decreased by 80% compared to last year. In Ukraine, a ban on air transport for the period of quarantine was introduced. This

led to the suspension of the airport indefinitely, which led to negative consequences for the financial condition of the company.

Financial reserves in the airport budget will be enough for one and a half months of work.

After the introduction of quarantine, Zhulyany International Airport still operates around the clock, but performs a small number of flights, complying with all established rules, regulations and requirements of the state. Zhulyany is currently the only airport in the country that serves evacuation special flights.

Regular flights are not performed, only special, humanitarian and cargo flights are performed. On a good day there are up to 20 of them, and at the same time last year there were 350. That is, the company operates at about 5% of its capacity compared to last year.

At the same time, the fixed costs for the maintenance of the airport building and adjacent territories were not shared anywhere: security, cleaning, maintenance of equipment in good condition. This leads to the fact that the airport is operating at a loss. The cargo terminal is the only airport terminal that is operating at full capacity, and the load of specialized cargo flights is now even higher than in the previous period before quarantine.

70% of the airport staff went on forced paid leave and received less than half of the salary they received in normal time. After the end of paid leave, management considers the possibility of reducing the salary of employees.

Due to quarantine, the Ukrainian airline, which is based at Zhulyany International Airlines (UIA), which currently employs about 1,500 people, plans to reduce both its fleet and personnel. The company's activities are completely suspended, no flights are performed, which of course affects the future activities of the airport.

In 2020 was the main problem of this situation now is the impossibility of clear planning of further work. No one can answer: for how long the work of world aviation was stopped, when the coronavirus pandemic will end, whether there will

be a second wave of COVID-19, whether people will want to fly at all, which routes will be in demand.

1. DESIGN PART

Air Transportation Management Department				NAU 20.02.96. 100 EN				
Done by:	Kristina A. Turchyna			**2. DESIGN PART**	Letter		Sheet.	Sheets
Supervisor:	Victoria Ye. Akmaldinova					D	22	11
Standards Inspector	Yuliia V. Shevchenko				FTML 275.403a			
Head of the Department	Dmytro O. Shevchuk							

2.1. Research of modern innovative technologies of passenger service at the airport

Innovative activity - is practical use of scientific, scientific and technical result and intellectual potential for reception of new or improvement of the produced product, the way of its production. Innovation activity is one of the spheres of activity of the enterprise, along with production, marketing, finance, personnel development. Innovative activity is characterized by goals, means, processes, forms of organization, results. The main purpose of innovation activity is creation of new goods (services) or goods (services) with new qualities. The means of innovative activity are used to attract to it production and experimental base, material, financial resources, personnel.

- Innovative development of air traffic airport services is carried out by introducing innovations in the following areas:
- Development of new services (reception and departure of new types of aircraft (AC), provision of intermediate positions of aircraft flying on new routes; acceptance of business aircraft);
- Improvement of quality and conditions of traditional services provision (increase of frequency of AC shipments; reduction of time of service of AC, passage of formalities by passengers; improvement of passenger service level to the international level; increase of airport category; reduction of airport fees);
- The increase in the volume of traditional services provided (increase in the intensity of movement of PS through the airport).

  The main means of solving the above tasks is development of the operating (production) system of the airport, which is carried out by the following ways:
- Development and expansion of usage of certain types of new equipment, technologies, improvement of production organization, introduction of managerial innovations, development of information technologies;

- Creation and acquisition of industrial intellectual property objects (licenses, patents, scientific and technical documentation, inventions, rationalizers, etc.);
- implementation of large-scale forms of reproduction of fixed assets: new construction, expansion, reconstruction, technical re-equipment.
- The application of new technologies in the performance of airports leads to an increase in the level of passenger traffic, attractiveness of airports both for domestic investors and for foreign partners.

As it was established in the process of research, the enterprise of Charles De Gaulle airport has high quality characteristics of passenger traffic service. However, companies in the service sector need to constantly improve, develop their own capabilities and increase their competitiveness. For this purpose innovative approaches in activity are used and innovative programs of development of enterprises of sphere of services, including airports are developed. The main directions in which innovative technologies are used by the largest airports in the world are listed below service and travel, from which feel a stronger sense of freedom and comfort. Therefore, by providing self-service opportunities to users, airlines improve the quality of services provided and at the same time reduce their own expenses.

Fig. 2.1. The walls of independent check-in of passengers

The general principle of providing self-service services is to put the functions of personnel on passengers. This allows distribution of passengers on the terminal complex, avoiding mass purchases in separate areas of the terminal, and increases the speed of formalities. Combining the registration on the airlines' web-sites, on the regular check-in desks (fig. 2.1), in mobile applications and self-service kiosks, the airport gets the possibility to manage queues, speed of formalities, optimal use of terminal areas, reduction of capital expenses on infrastructure.

Four walls of independent check-in of passengers and baggage, which occupy the same area as one standard check-in desk, but at the same time provide four times higher speed of passage of passengers. Here on the stands passengers independently and quickly register themselves on the flight with the seal of boarding pass, weigh the baggage and stick on it a sample, printed in the same kiosk. After check-in, passengers approach the drop-Off counter next to the conveyor belt and send their baggage to the flight, in a set, where it is sent to the car train and delivered on board the aircraft.

There are also the walls of independent baggage registration (Fig. 2.2), which are installed on already existing regular check-in desks at the airport, which allows to deprive the airport of expensive investments and significant changes in the airport infrastructure. This counter can be supplemented by equipment for passenger registration and excess baggage payment.

Fig. 2.2. The walls of independent baggage check-in

2.2. Project to improve passenger service at “Kyiv” airport by introducing assistant workers at Airport Guide Robot.

The purpose of innovation development of IA "Kyiv" is to define priority directions of innovation activity of the enterprise, formation of complex of measures and organizational mechanisms which will allow:

- present the company’s activities and provide services at a new quality level, in accordance with the best applicable foreign practices, both now and in the future;
- significant improvement of key performance indicators of the production process;
- to ensure a substantial strengthening of market positions;
- we should introduce effective mechanisms of innovative provision of services to passengers.

As part of the implementation of innovative passenger service technologies at the investigating company, we propose to develop a project for the implementation of assistance workers at Airport Guide Robot in the service of passengers at Terminal A of Kyiv Airport.

For the first time LG introduced CES 2017 in Las Vegas, which was specially designed for airports. Starting from July 21, 2017, LG launched several of its work in the international airport of Seoul in a test mode to provide assistance to arrive and take place travelers. LG works are run around the airport building, providing information and assistance to passengers as a guide

Airport Guide Robot (Fig. 2.7), which works on the basis of advanced artificial intelligence and the technology of voice recognition, is an electronic assistant capable after scanning a plane ticket, to provide travelers with all necessary information. Thanks to the LG Voice Recognition Platform, the robot is able to communicate in English, Chinese, Japanese and Korean and can provide passengers with the necessary verbal assistance. By improving the software, you can "teach" the

work of talking in other languages. For IA "KYIV" ROBOT in the first place to speak Ukrainian and English, and in the further, if the project will be successful, will be able to download other necessary languages for communication with passengers from all over the world.

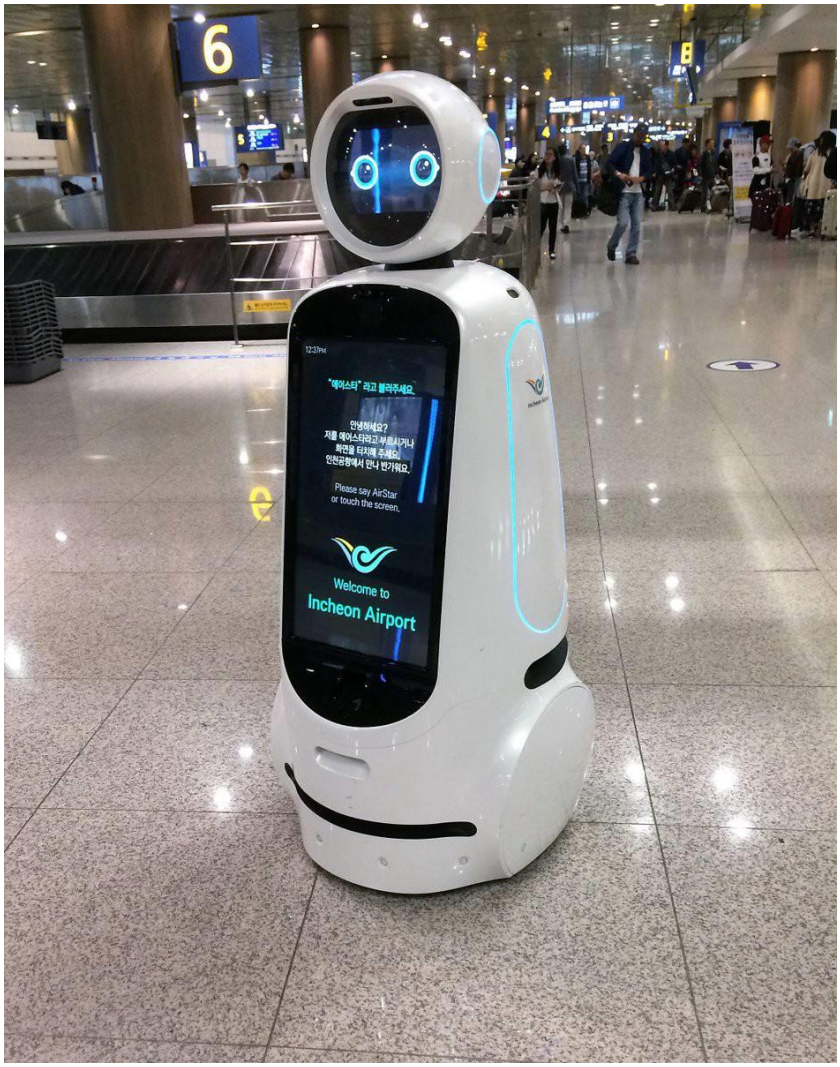

Fig. 2.7 Airport Guide Robot

Airport Guide Robot will be able to take people to the required terminal. The robot can connect to the central server of the airport to transmit information about the time of landing of the aircraft, the location of restaurants, shops and other information. After scanning the boarding pass, the robot guide can accompany passengers who are late or have lost their way to the required boarding gate, as well as provide information about the time of boarding and even weather forecast at the destination.

Airport Guide Robot software includes a stand-alone navigation and the ability to avoid collisions with obstacles. This robot is able to identify the areas that most often use passengers, save information about them in its database and calculate the most effective route for travel.

The robot guide is connected to the main airport server, it will move through the terminals, providing travelers with various information, including flight departure and boarding times, as well as airport service locations, displaying the location, location, and route to the site on the available display.

The Airport Guide Robot project will be intended for passengers using Kyiv airport as a destination, destination or transfer point. Target audience - all passengers of the airport who are ready to use the help of assistants to search for necessary information about placement of any airport objects, from gates to boarding to parking or public transport stops. Airport Guide Robot is able to work continuously and at any time will help a passenger with a problem, and the ability to speak in different languages considerably increases its efficiency. In the modern world, people are used to using the latest technologies to find the necessary information and the possibility of turning to a person who may not always understand the foreign language will be in demand.

The introduction of assistant work in general allows to significantly increase the efficiency of the enterprise work in different directions. The distinctive feature of modern technologies is that they adapt quickly to changes in processes. And connection to the central system of the airport will allow immediate important information, concerning operation of the airport not only on information screens or sound channels, but also on these works, which passengers will pay attention to due to bright and unusual design for our country.

Airport Guide Robot has a number of obvious advantages over human labor force:

- high speed of information processing;
- working 24/7 365 days a year;
- high accuracy;

- accuracy of the technological process;
- minimum requirement for service;

For the trial period of use of assistant works we offer to buy 20 units of LG Airport Guide Robot, 6 units per each level of terminal A and 2 units in the VIP-hall of the terminal. The price per unit Airport Guide Robot from the manufacturer is 500 000 UAH.

The total cost of purchasing 20 Airport Guide Robot units is:

The cost of installing the software of the works and loading the control systems of the devices into the centralized airport management system will be 50 000 UAH per unit.

Total costs for software installation and system setup:

The salaries of the employees of the software department for primary maintenance of devices are 25 000 UAH per unit.

The total wage costs for employees are:

The total amount of investment costs for the project is presented in Table 2.1.

Table 2.1

Investment costs by project

Item of expenditure	**Amount Thousand UAN**
Acquisition of Airport Guide Robot	10 000
Software installation and system configuration	1000
Wages for initial setting	500
In general:	11 500

Capital investments into the organization of innovative idea will be 11,5 million UAH.

Depreciation is calculated in a linear way based on the service life and condition of the equipment.

The sources of financing of capital investments under the project are their own sources - net profit of IA "KYIV"

Further servicing of these devices will be performed by the system administrator of the airport, who will receive salary according to the established rules of calculation of the airport's salary.

The project's estimated term is 7 years, as it is the guarantee period of operation of all equipment without major repairs, so all forecast indicators are calculated for this period.

The project provides a list of annual variable costs. Current repair and maintenance of equipment includes elimination of certain defects, preventive measures, reviews, invitation of experts for consultations, inspection of equipment annually. Other variable costs are unpredictable breakdowns, failures and complications of work.

Table 2.2

Constant and variable expenses on the project, thousand UAH.

Expenditure item	**1 year**	**2 years**	**3 years**	**4 years**	**5 years**	**6 years**	**7 years**
Constant expenses							
Salaries to employees, serving work	100	105	110	115	120	125	130
Depreciation	108	117	126	135	144	153	162
In general (constant expenses):	208	222	236	250	264	278	292

Continuing of the table 2.2

Expenditure item	**1 year**	**2 years**	**3 years**	**4 years**	**5 years**	**6 years**	**7 years**
Variable expenses							
Routine minor repairs and servicing of devices	50	55	60	65	70	75	80
Unforeseen expenses	15	20	25	30	35	40	45
In general (variable expenses):	65	75	85	95	105	115	125
Expenses in general:	273	297	321	345	369	393	417

Maintenance and maintenance costs for 7 years will be 2 145 thousand UAH

The main costs of repair of devices during their use are included in the depreciation expenses, indicated in the second graph. Minor repairs of minor damages are carried out at the expense of the article of variable costs (routine repairs). The article of unforeseen expenses is included in the variable expenses in case of force majeure.

The amount of current expenses is financed from the working capital of the enterprise.

No net profit from passenger use of passenger assistance data will be received as Airport Guide Robot services will be free of charge. However, the introduction of these devices will affect the quality of service at the airport as a whole, and will reduce the load on the terminal employees, who are constantly disintegrating passengers from their direct duties. The productivity of the employees will increase in the service sector they work, this will increase the number of passengers, which can be served by a certain airport employee for a certain period of time.

The increase of the general level of passenger service quality, due to the introduction of innovative technologies, will allow IA "Kyiv" increase the number of airlines serving at this airport. This in turn will lead to an increase in the number of flights and passenger traffic.

As the direct profit from the use of assistant workers Airport Guide Robot airport can not get, all costs of the project will be included in the airport fee for servicing passengers in the airport terminal.

Passenger service fee in the airport terminal is set for one passenger, depending on the type of connection and indemnifies the expenses of the airport operator (airport) for the use, maintenance and development of the passenger terminal for servicing passengers during departure/arrival/transfer (except for commercial areas, which are subject to rent, comfortable rooms and high-rise areas). and persons who meet and carry out passengers, as well as equipment for servicing passengers and baggage in the airport terminal (excluding airlines), as well as creating conditions for customs and passport control, ensuring proper access to services of passengers with disabilities or persons with disabilities, use of ground transport means of the airport, which relate to the provision of access to the terminal building (buses and/or other types of transport for the transfer of passengers between the airport terminals).

The fee for servicing passengers in the terminal for publication in the reservation systems and for the user is for international connections – 13,00 USD (380 USD, at the rate from 20.05.2022) for each passenger sent;

The fee for servicing passengers in the airport terminal for publication in the reservation systems and for the user is for transfer passengers who arrive and are sent on international flights for international connections – 8,50 USD (280 UAH, at the rate from 20.05.2022) for each transfer passenger sent.

Not every passenger will use these devices, but it is advisable to distribute all necessary project costs to the average number of passengers serviced by Terminal A during the year.

On average, Terminal A has been serving 8 to 10 million passengers in recent years. According to forecasts, the number will increase. For further calculations, in

case of unpredictable circumstances we will take the smallest number of passengers 8 million

The total cost of the project together with constant and variable expenses for 7 years is 13 915 000 UAH. In order to cover all costs of the project during the first year of use, the fee for servicing one passenger should be increased by UAH 1,74.

Thus, the fee for passenger service for passengers of normal flights will be 351,74 UAH, and for transfer passengers 231,74 UAH.

SUMMARY

Air Transportation Management Department				NAU 20.02.96. 002 EN			
Done by:	Kristina A. Turchyna			SUMMARY	Letter	Sheet.	Sheets
Supervisor:	Victoria Ye. Akmaldinova				D	34	2
Standards Inspector	Yuliia V. Shevchenko				FTML 275.405		
Head of the Department	Dmytro O. Shevchuk						

Under the influence of market economy and accordingly competitive struggle, the activity of airport enterprises requires improvement annually. Improving the quality of service for passengers at the airport should be one of the main goals of the company, which wants to consolidate its positions on the international market of air transportation, as passengers are the main target audience of the airport. The improvement of the passenger service system can be successfully carried out with the help of innovations and innovative technologies.

Within the framework of the diploma work the methods of estimation of the quality of service of passengers at the airport "Kyiv " are considered, possible ways of improvement of the quality of service of passengers due to introduction into the system of service of passengers of assistants, who are able to provide to passengers information about the location of various important objects of the airport infrastructure.

The following tasks were solved for realization of the research goal:

- the airport is a well-studied company: its characteristics, main production and financial indicators, quality of service of passengers at the airport;
- the requirements of the normative documents, which are presented to the level of quality of passenger service, have been studied;
- methods of assessing the quality of service of passengers at airports have been studied;
- we have studied possible innovative technologies of passenger service in the leading airports of the world;
- at the same time, we have developed a project of innovative innovations aimed at improving the quality of passenger service at the investigating enterprise.

Within the framework of realization of the research objective the project of introduction in servicing passengers of assistant workers Airport Guide Robot in servicing passengers at Terminal A of airport "Kyiv" has been developed.

The main users of these devices will be passengers who use KYIV airport as a destination or destination, or as a transit point. The robot is able to speak several languages and can provide passengers with the necessary verbal assistance. Airport Guide Robot will be able to take people to the required terminal. The robot can connect to the central server of the airport to transmit information about the time of landing of the aircraft, the location of restaurants, shops and other information.

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