

# A Benefit-Cost Analysis of Korea's “Advance Passenger Information System”

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**-- Table of Contents --**

* Acknowledgement	.....	1
* Executive Summary	.....	2
1. Introduction	.....	3
2. Literature Review	.....	4
3. Methodology and Data Source	.....	6
4. Korean Advance Passenger Information System	.....	8
5. Identification and Estimation of Its Values	.....	10
6. Costs	.....	17
7. Total Net Benefits	.....	18
8. References	.....	21

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## **-Executive Summary –**

Since the tragic 9/11 terrorist attack on the United States in 2001, many countries have been following the US's decisions on the introduction of an air security program. At the heart of the program is the Advance Passenger Information System or the API system. Considering major developed countries' stances and related international organizations' efforts toward the API system's advance, it seems that the introduction of the API system is expected to be a necessity or a kind of obligation both to border control agencies and air flight companies in the near future. However, this does not mean that the introduction of the API system is not without criticism or controversy.

The controversy boils down to the questions of "Is it really proven to be effective in increasing air security" or "Do the expected benefits exceed the total related costs?". This paper is aimed at trying to answer these questions for the Korean API system.

Three major benefits relating to departure, entry and transit management activities will be identified and estimated when possible. As will be shown in detail in the following sections, benefits from consumer convenience make up major share of total calculated benefits. Other values relating to 'qualitative' benefits are hard to calculate; for this reason, those benefits will not be counted into total numerical values. For the cost side of this analysis, personnel costs and system-related costs like user fees and maintenance costs will be considered. Besides these costs, API system establishment costs could also be counted. However, it seems to be hard to separate the API system establishment costs from all other immigration efficiency systems costs. In addition, the initial establishment costs do not look big on the annual basis, since its introduction was more than ten years ago. Private air carriers should also pay their shares of burden for establishing and operating the system. However, getting access to these private business data is limited and technically making calculation works too complex. Therefore, for balanced analysis, this paper only concerns about costs and benefits in the public sectors.

Based upon this analysis, the total net values of the Korean API system reach up to \$62,600 in the year of 2015.(The exchange rate-1,200won/dollar- between Korean won and dollar is applied on the basis of March of 2016 when this paper is written).

## 1. Introduction

How can the international flow of people be expedited without damaging national security and consumer convenience in this highly integrated world? Too much emphasis on security and thorough screening process in airports will be easily connected to long waiting lines, loss of passengers' precious time and ensuing consumers' dissatisfaction. This could produce diminished competitiveness for the airport and even for the country, an unfavorable scenario in this globalized age. At the opposite extreme, loose security measures in favor of conveniences could end up with a disaster. In their paper of "Sacrificing Civil Liberties to Reduce Terrorism Risks", Viscusi & Zeckhauser pointed out these trade-offs among security, liberties and convenience.

What if we can find policy options in which we don't have to sacrifice civil liberties or conveniences to reduce or prevent possible terrorist attacks? With this possible scenario in mind, many developed countries, such as Canada, Australia, and European countries have been following the case of the US' introduction of 'Advanced Passenger Information System'(APIS). In addition, related international organizations like the World Customs Organization(WCO), the International Air Transport Association(IATA), and the International Civil Aviation Organization(ICAO), have been trying to come up with some standards in efforts of facilitation of internationally co-operated implementation of this system. The Korean Immigration Office also joined this trend of adopting the API system in 2005, and has been preparing to expand the scope of the API system's advantages. This possibility of increasing security level without causing any liberties or conveniences sacrifices may be obtainable with the help of investments and advances in technologies. Do these international efforts mean that the introduction of APIS is something proven cost effective or contributive to national security? To surely say that, it seems that we still need more years and more in-depth studies surrounding this issue. Unfortunately, as of now, we can't find enough studies or evaluations on the benefits and costs of API system. It might be, in part, because of the difficulties of calculating the possible benefits like increased national security and passengers' conveniences. The restricted access

to the related 'sensitive' data could be another explanation. The objective of this capstone paper is to try to identify and quantify some conceivable and proven benefits of the Korean API system. This kind of post-policy evaluation based upon benefits and costs for the API system is rare. Through this work, policy decision makers- hopefully for both Korean authorities and other countries- can get an idea of the effectiveness and worth of an API system. That is the motivation for this research.

For the second section, main controversies surrounding the API system will be reviewed. Next, the benefit-cost analysis (BCA) methodology for this research will be described in terms of its advantages and limits for this kind of research. In addition, data source and their credibility will be described. Then, particular characteristics of the Korean API system will be described in more detail for better understanding of identified benefits and their quantification. The core work of this paper- to quantify and calculate some benefits of the Korean API system- will come next and will be compared with related costs.

## **2. Literature review**

The essence of the API system is to get passenger information from private air carriers in advance before passengers get on board for departure and entry into any country. The main purpose of asking for passengers' information in advance- as soon and detailed as possible for its maximum security effects- is to increase border security. Surely acquiring advanced passenger information and cross-checking with databases on blacklists will be helpful for the authorities to prevent possible terrorists or unqualified passengers from getting on board or entry into secured areas like airport facilities. Furthermore, through this pre-screening process with passenger data, bona fide passengers can get benefits in terms of reducing unnecessary waiting time for security check. However, for the introduction of the API system, some costs both to private flights companies and to general taxpayers would be unavoidable for the establishment and operation of the necessary technical communication system between private companies and border control agencies. In addition, collected and transmitted passengers' information is always in danger of being mismanaged and overused for

unintended purposes. This is why a privacy protection issue springs up in the debate of the API system.

Summing up, main controversies which surround the API system can be categorized into two main areas. One part is concerned with this question: “Will the benefits of the introduction of API system-like the possibility of increased security and passenger satisfaction in terms of their improved conveniences- surpass the related costs?” Or “Is it a cost effective solution to increase safety and conveniences of the general public?” According to guidelines of ICAO on API, API’s benefits come from four main categories: passengers, air carriers, border control agencies, and airport authorities. Passengers can save their valuable waiting time. The authorities can possibly obtain the increased security without imposing negative impacts on non-targeted travelers. Air carriers have the potential of reducing carrier exposure to penalties for transporting passengers that are not properly documented. To get answers to the first issue, we have to know how to calculate the aforementioned benefits of the API system. Unfortunately, however, most of the possible benefits come from qualitative areas, which are extremely difficult to be monetized. These features combined with restricted access to relevant data could be an explanation for so rare studies in this area. One trial of monetizing some benefits and comparison with costs can be found in the regulatory impact assessment by the Canadian Border Service Agency(CBSA, 2015). The agency estimated that “there would be a total monetized benefit of Canadian \$ 2.23 million associated with an API system, resulting from the prevention of inadmissible travelers arriving at Canadian territories”. (CBSA, Vol. 149, NO 26 - June 27, 2015) This number is relatively small in comparison with their total costs of 77.36 million Canadian dollars. But, as they pointed out, their works did cover only partial benefits coming from API system. In their assessment, they categorized the following parts as 'qualitative' impacts: 1) benefits to Canadian public-increased national security and public safety, facilitation of admissible travelers, 2) benefits to government-facilitation of Citizenship and Immigration Canada’s(CIC) electronic travel authorization(eTA) initiative for air carriers, better allocation of resources by the CBSA due to fewer inadmissible arrivals requiring fewer detentions/removals, 3) benefits to commercial air carriers-reduced exposure to costs and penalties for transporting

passengers who would be known to be inadmissible upon arrival. These ‘qualitative’ benefits could be much more sizable than the part they covered. So with the continuing advance of monetizing works, the net benefits will be a lot different. This paper could be seen as that kind of work.

How can we manage and utilize collected information without violating travelers’ privacy? The other part is connected to this question. Airlines may collect, store and transmit passengers’ API information only in accordance with applicable national legislation, which varies from country to country. Basically, countries can limit their data requirements to the minimum necessary and according to national legislation. For API to function successfully and on a widespread basis, however, it is essential that there is a very high-degree of uniformity in relation to the data required by the border agencies. For this matter, the related international organizations have been in efforts of identifying and recommending the basic data guidelines that should not be exceeded. That basic information could be divided into two distinct categories, data related to: (1) the flight(header data) and (2) each individual passenger(item data). Besides this kind of international effort of identifying and scoping the essential level of information, some locally-based studies have been conducted to prevent the possible violation of privacy in the process of getting access to commercial passengers’ data by the authorities. In many countries, the authorities can get access to the so-called Passenger Name Records(PNR), which is collected and stored by airlines in the process of checking in. PNRs contain more wide scope of passenger data which can make specific passenger ending up in danger of privacy violation. In his research, Moon(2009) pointed out the possible violation of privacy in the process of aviation profiling and the need to legal backup of that action.

### **3. Methodology and data source**

For this paper, a BCA framework will be used. Benefit-cost analysis provides an organizational framework for identifying, quantifying, and comparing the costs and benefits (measured in monetary values) of a proposed or come-into-force policy action. The final decision is informed by a comparison of the total costs and benefits.



In more detail, this paper will compare benefits and costs on the government side, not including the private companies' costs and benefits. Hopefully, in the future, this paper could be expanded into covering all costs and benefits both to private and public sectors. As of now, however, this paper will be satisfied with covering and starting from the public sector in which the researcher is serving. In part, it is because of the difficulties of access to reliable private sector data and time limits for this paper.

There is one more thing to be noted about the concrete comparison of benefits and costs. For this paper, all the costs and benefits will be calculated on the basis of 'representative' one year period-2015. There are two main reasons for this. One is the relative ease for data acquiring and comparison of costs and benefits without damaging the core intuitions behind this paper. In reality, costs relating to the establishment of a computerized API system in Korea are closely intertwined with other facilities modernization projects. So it is not easy to accurately separate API costs from integrated total costs, which reach up to \$2,500,000. In addition, those prior establishment costs are relatively small compared with operating costs such as personnel costs and maintenance costs in every year. For a fair comparison between benefits and costs during the same base year, total benefits for one base year(2015) will be calculated. There is no special reason for choosing the year 2015 as the base year except updated and easy data access. It can be promised that there will be no worry about distortion or exaggeration on purpose. Rather, as will be shown later, total performances of the API system in 2015 are fairly below the average performances during the previous years.

All major data relating to costs and benefits come from the actual Korean API system and annual reports on its performances and financial documents, much of which are internal reports within the agency and are not published for the general public under normal circumstances. Someone who might want to get access to these internal documents could ask for its openness based on related national legislation. These primary data are believed to be credible enough to support this paper's reliability.

## 4. Korean Advance Passenger Information System

This section is designed to explain how the Korean API system has been assisting and improving border control and inspection processes in Korean ports. Features or changes followed by the introduction of the API system will be categorized into three main categories: departure, entry and transit passenger management.

### A. Departure clearance process before and after APIS

First, consider the changes in the departure clearance process. The work flow below was the typical situation that passengers could expect at the airport for their departure from Korea before the introduction of the API system.

#### - Departure Process Work Flow 1(before APIS)

Step 1. Arrival in airport

Step 2. Check-in at air carriers' counter

Step 3. Passing through security area with body and luggage screening

Step 4. Departure inspection by immigration officers

⇒(with no problem) Proceed to boarding

⇒(with any problem) Back to the non-security area to solve problems

With the help of the departure API system which is called iAPP(interactive Advance Passenger Processing), the previous work flow changed into this new process.

#### - Departure Process Work flow 2(with APIS)

Step 1. Arrival in airport

Step 2. Check-in and being notified about any problem

Step 3. (with no problem) Proceeding for body and luggage screening

(with any problem) Proceed to notified office for solving problems

Step 4. Departure inspection by immigration officers

⇒(with no problem) Proceed to boarding

⇒(previously with problem but now solved) More easily proceed to boarding

Summing up, there was no change for passengers without a problem. But 'troubled passengers' who had to leave secured areas for solving their problems don't have to experience that time-wasting and unpleasant situation any more. The reason is they can be notified about possible problems at their check-in step in advance. They can get their problems solved first, and then proceed to departure inspection for a safe and pleasant departure. This change is possible because the iAPP-Korean departure API system- responds to air carriers' asking in almost real time whether any passenger is allowed to get on board or not at the check-in step. If air carriers get a 'no-boarding' sign, they inform 'troubled passengers' where to go for clearing their problems. This improved process is helpful to all - both trouble and trouble-free passengers- by saving waiting time and enhancing security by blocking possible 'trouble makers' from entering secured areas.

This Korean departure process is pretty different from US's departure process where there is no official departure inspection conducted by immigration officers. In this sense, Korean departure API system(iAPP) can be said to make considerable contribution to customers' convenience, as well as increased security.

## **B. Entry inspection process before and after APIS**

The main argument behind the API system was this: "getting possible terrorists or inadmissible passengers out of boarding before they get on board and leave for any territory." Unlike US and Canada, however, the Korean API system has not yet developed to this full-blown stage, even though they have been preparing to adopt this scenario. In reality, this is a just matter of policy choice, not technology.

Nevertheless, the Korean API system has contributed to facilitating entry inspection process on the spot by providing useful information about 'possibly inadmissible passengers' to primary inspectors. Without the API system, inspectors on the spot have to decide whether a passenger is admissible or inadmissible based upon very limited information with time pressure. In this situation, inspectors' personal judgement might end up with an unfavorable scenario for national security and total passenger convenience. With help of the API system, profilers can do their first

screening process based upon more extensive data which are collected and transmitted by air carriers, and with more time flexibility. Provided with these information, inspectors' judgements in the clearance booth could be expected to be faster and more pertinent.

### **C. Transit passenger management process before and after APIS**

An international transit passenger is someone who stops by any country's jurisdiction for a connecting flight leaving for his or her final destination. For example, many passengers stay in Korean or just in airport area for short time to wait for their next flights leaving for US, Japan, China or any other country. Based upon statistics, transit passengers make up about 14 to 17 % of total arriving passenger composition, reaching up to almost 10,000 passengers in 2015. What matters in this situation is this fact. Among transit passengers, many illegally documented passengers who want to entry Korea or any other foreign countries try to advantage on this transit system to meet their illegal brokers and seek chances to obtain their goals. For this reason, effective and secured management system for transit passengers is important. Prior to the introduction of the API system, however, it can be said that there was no any meaningful management and monitoring system for transit passengers. Because advanced passenger information is essential for detecting and monitoring any possible 'inadmissible travelers'.

## **5. Identification of benefits and estimation of its values**

For this paper, three main benefits-one benefits in each management area- will be examined.

### **A. API System benefits in departure management area**

As explained in previous section, one particular feature of the Korean departure API system(iAPP) is that it can prevent both 'targeted and non-targeted' travelers from lining up in the same waiting lines. This came to be possible by letting 'targeted passengers' know of their problems in advance- at the check-in process. Through this change, 'targeted passengers' can solve their problems before waiting in lines in vain, at the same time 'normal passengers' can benefit from faster and unstopped flow of inspection processes. Then, how much time can be saved for

both 'targeted and non-targeted' passengers? And, how much monetary value can we put on those saving time?

Table 1. Numbers of 'no-boarding' passengers in departure

<b>Year</b>	<b>Daily Average</b>	<b>Total Number</b>	<b>Problem with travel documents</b>	<b>Problem with immigration office</b>
<b>2009</b>	<b>133</b>	<b>48,702</b>	<b>25,655</b>	<b>23,047</b>
<b>2010</b>	<b>109</b>	<b>39,776</b>	<b>25,532</b>	<b>14,244</b>
<b>2011</b>	<b>168</b>	<b>61,203</b>	<b>21,876</b>	<b>39,327</b>
<b>2012</b>	<b>247</b>	<b>90,190</b>	<b>22,476</b>	<b>67,714</b>
<b>2013</b>	<b>189</b>	<b>68,997</b>	<b>20,151</b>	<b>48,846</b>
<b>2014</b>	<b>120</b>	<b>43,967</b>	<b>16,190</b>	<b>27,777</b>
<b>2015</b>	<b>85</b>	<b>31,035</b>	<b>14,545</b>	<b>16,490</b>

*- Excerpted from Korean APIS section annual performances report in 2015-*

Table 1 shows statistics relating to passengers who get 'no-boarding' sign when they check-in for departure from Korea. Total numbers are divided into two different categories, 'problem with travel documents' and 'problem with immigration office'. The reason for this differentiation is connected to the difference in terms of related governmental body and ensuing saving time. In more detail, passengers falling into the 'travel documents' category have to go to the Ministry of Diplomacy to get a new passport or tackle problems with their travel documents. Passengers in 'immigration office' column need to head for Korean Immigration Office for dealing with various legal problems like expiration of their staying period, clearance from 'watch-lists' etc. In other words, in each case, the agencies for solving their respective troubles are different, which causes different effects on their time saving and even safe boarding itself.

Besides passengers' time saving, many more aspects can be possibly added for the iAPP's benefits, such as overall consumers' satisfaction and facilitated co-operation among law enforcement agencies within border control areas for general security improvement. These intangible benefits seem

to be fairly hard to calculate, considering lack of related data and limited access to those data. So, for this paper, we will focus only on passengers' saved time. One more thing, as mentioned in previous section, we will try to calculate the year 2015's benefits only.

To get monetary values of saving time for both categories, we need to find how much time they save, and how much is the saved time worth per unit time. This work will be the core in this paper and could be leading to totally different results among various stake-holders.

#### **- How much time will be saved?**

First, how much time can be saved? At my best knowledge, there has been no official trial to measure this time saving. The measurement is solely based upon the writer's experiences and knowledge about physical locations of related agencies, work processes, and necessary time for handling passengers' problems on normal conditions. However, this measurement will surely not make a negative impact on this paper's reliability on this matter, because the writer has been working at the related areas for almost ten years. For this paper, we will use about 20 minutes' saved time for one 'targeted passengers'. This seems to be justifiable, given physical distance and moving time between security areas and related agencies, and notifying processes about how to handle their problems and where to go.

It has been said that there are two different types of time in costs and benefits analysis on travel time: 'clock time' and 'perceived time'(2013, Victoria Transport Policy Institute, pp 5.2-2) Clock time is measured objectively, but perceived time represents individually conceived subject time which can vary greatly from clock time. It will be much larger than clock time under unpleasant and stressful conditions. For more objective and simplified analysis, we will use clock time for our time saving, and other special conditions will be accounted for in the next estimation part. Based upon this measurement, the total saving time for passengers who get 'no-boarding' sign in their check-in process would come to 10,345 hours in 2015(31,035 passengers \* 0.33 hours per person).

How about time saving for non-targeted passengers? Passengers who get 'boarding' sign can also save their waiting time not by lining up with 'targeted passengers' at the same line. Assuming the normal conditions on passengers' usual waiting time and numbers of passengers who might end up

with being in the same line with 'targeted passengers', we can estimate the total saving time for 'non-targeted' passengers (total number of 'targeted passengers' \* 'normal passengers' who might be in the same line with 'targeted passengers' \* saved time per those passengers). It is estimated that the total saving time for this category will reach up to 31,035 hours in 2015 (31,035 passengers \* 30 passengers \* 0.033 hours = 31,035 hours). Summing up, the Korean departure API system (iAPP) makes contribution to saving 41,380 hours' waiting time for all departure passengers in 2015.

**- How much monetary values should be put on per unit saving time?**

This subject is more perplexing and more controversial issue than the previous one because it is essentially related to a variety of characteristics in so different situation. Even if we limit our topic to the time saving in travel or travel-related activities, there are so many things to be specially taken into account for calculating time value such as whether it is business or leisure trip, whether waiting conditions are pleasant or unfavorable, and whether passengers' individual income is high or low.

Probably the best estimates of waiting time value will be able to be obtained from surveys to the very travelers who might have experienced those situations: "How much are you willing to pay to avoid that waiting time of 10 or 30 minutes?" This method of contingent survey is popular in many areas of costs-benefits analysis. However, to my knowledge, that kind of survey has never been conducted in the context of the Korean API system. As another method, researchers can try to determine the characteristics of the travelers like the typical wage for travelers. They can also try to determine the special conditions in which travelers' waiting takes place, like the length of waiting time and weather. These special conditions can be added up in calculating the value of waiting time. These methods could lead us to get the best estimate of its values, but it has its disadvantages of time-consuming and expensive way to do it.

For this paper, we will review some literatures on the first hand to find out existing studies and common ways among researchers and technicians in the field of costs and benefits analysis on travel and saving time. Then, some pertinent and special characteristics for this research will be examined.

Based upon some guidelines of US department of transportation about conducting economic

evaluations on the value of 'travel saving time', there are some principles.

*"First, saved time could be dedicated to production, yielding a monetary benefit to either travelers or their employers. Second, it could be spent in recreation or other enjoyable or necessary activities for which individuals are will to pay. Third, the conditions of travel during part of all of a trip may be unpleasant and involve tension, fatigue, or discomfort. Reducing the time spent while exposed to such conditions may be more valuable than saving time on more comfortable portions of the trip."(The Value of Travel Time Savings: Departmental Guidance for Conducting Economic Evaluations Revision 2, pp 2)*

Following the principles, many studies have tried to identify some special-which might be pleasant or unpleasant-conditions, such as congested time, unfavorable weather condition, and urgent travel etc. It is widely accepted that specially weighted time value will be counted under unpleasant settings. In their research, Lee & Choi(2011) suggested that different time values should be estimated by a different time period. According to them, time values during congested time period should be greater than uncongested day time period. Many studies also have emphasized personal traits like income, sex and nationality. Given so diverse variables and limited data, however, it does not seem to be possible to come up with any satisfactory model fitting into any standardized situations. Because of these wide variances of time value, governmental decisions on time value tend to ignore or simplify many important factors.

Another subject of discussion is concerned with the existence of some threshold below which saved time value will come to zero or be ignored. Some research suggests that "small saving may have negligible benefits. But as pointed out in aforementioned US Transportation guidelines, "there is no persuasive evidence of where such a threshold might be for any population or how it could be used to predict an appropriate threshold for another. A more important problem is that all changes in travel time resulting from government actions are composed of many smaller changes, and it would be impossible to identify particular changes considered big enough to affect each individual decision. To evaluate the aggregate impact of any action, therefore, we must assume that the value of each minute of saved time is constant, regardless of the total time required for a trip."(The Value of



Travel Time Savings: Departmental Guidance for Conducting Economic Evaluations Revision 2, pp 3)

Coming back to this paper's purpose, what standard values can we use for our analysis? As mentioned above, both contingent survey method and traditional way focusing passengers' characteristics look too time and cost consuming way. For this reason, we pay much attention to finding out observable market price which can be applied to our situation. According to "Standards for Air Travel Dispute Settlement between Consumers and Companies" which is a kind of administrative regulation made by Korean Fair Trade Commission in 2015, private air carriers are required to compensate 10% of airfares to consumers for its late flights within from 2 to 4 hours. This is not something having legal effects, but as a last resort prior to lawsuits, it has practical binding force to both disputes parties. In this sense, it can be said that this standard provides a simplified and useful criteria for this paper.

If we apply '10% compensation rule' above to our case, total values of saved time with the help of the iAPP reach up to \$620,700( $41,380 * \$15 \text{ dollars} = \$620,700$ ). For this calculation, an assumed 'representative air fare' was used. In reality, international airfares departing Korea could range from \$100 to \$2,000 for economy tickets dependent upon its destinations, which could also vary widely based upon busy and off seasons. Possibly, average airfares can be calculated more accurately, but it seems too costly and uneconomical in terms of costs-benefits analysis.

In spite of our simplified model, one special condition should be considered for passengers having problem with their travel documents. Those passengers should usually get issued new documents which requires at least one hour of waiting time. This hour waiting could lead to miss their planned flights in many cases, which may cause additional penalty fees-normally around \$100- for rescheduling their flights. Assuming this unfortunate situations as 20% out of total undocumented passengers, the additionally saved costs or benefits will come to \$290,900( $14,545 * 0.2 * \$100$ ).

Summing up, the total monetary value will reach up to \$911,600 if we apply KCA's recommended time value and special condition for undocumented passengers to our calculated total saving time( $\$620,700 + \$290,900 = \$911,600$ ).

## **B. API System benefits in entry management area**

Unlike US and Canada, the Korean API system does not send 'no-boarding' signs to travelers who check-in outside of Korean territory for their flight for Korea. Therefore, the Korean API system benefits in this category are limited to conducting previous check-up for passengers- who are already on flights destined to Korea, based upon advanced information, to find possible inadmissible passengers. The final decision to prohibit any traveler from entering Korea is made by inspection officers at the clearance spot through careful considerations about comprehensive conditions, not just based upon advanced passenger information. For us to add this type of benefits and calculate its values into our total benefits, however, we need more confirming data which prove that there has been increased number of detected inadmissible passengers due to the API system, and that how much the API system contributed to detecting the inadmissible. As of now, however, we do not seem to stand at that position.

For this reason, this benefit and its calculation will be remained for future studies. For this paper, we are satisfied with pointing out that the Korean API system has truly some benefits in this management area, and that if we can calculate this benefit with relevant and reliable data, the total benefits would be larger than what this paper estimated.

## **C. API System benefits in transit passengers management area**

With the help of the API system, the Korean Immigration Office came to get its own effective system to detect illegally documented passengers in transit area who might try to enter Korean or other countries' territory. Table 2 below shows total numbers of illegally documented passengers in transit area since 2011.

Table 2. Numbers of detected illegally documented passengers in transit area

<b>Year</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>
<b>Total number</b>	<b>0</b>	<b>16</b>	<b>30</b>	<b>36</b>	<b>37</b>

*- Excerpted from Korean APIS section annual performances report in 2015-*

What benefits can be or should be added to our total model? Two benefits can be thought of,

direct and indirect benefits. Direct monetary value can be estimated in one plausible scenario in which all detected illegal passport holders get caught in destination country's airport. In this case, air carriers have to pay some fines for boarding and carrying those illegal travelers to the destination authority. For example, according to US immigration law, air carriers can be subject to fines of \$2,000 for each arriving passenger lacking visa or other required paperwork(*Immigration and Naturalization Act, clause 274c*). If we apply the numbers of Table 2 above, fines of \$74,000( $37 * \$2,000$ ) can be avoided in 2015 from detecting and prohibiting those passengers from boarding. These kinds of fines vary from country to country. According to Korean Immigration Law, the amount of fines can reach up to \$1,670(*Korean Immigration Law, clause 100*). In any case, this amount is an estimate of the benefits.

The other indirect effect comes from increased credibility of Korean immigration office's law enforcing activities. Once we get the good reputation of 'secured area', other countries can pay less attention to passengers who depart from Korean territory. This credibility effect will benefit all legal passengers leaving Korea by loosened security checks and shortened waiting times in their destination. However, even though this credibility benefits might be considerable, it seems to be too hard to quantify this benefits given too much variables and limited data.

#### **D. API System total benefits combining three different management areas**

Summing up, all combined monetary values benefited from operation of the Korean API system in 2015 come to \$985,600.(\$911,600 + \$74,000 = \$985,600) As explained, this estimation represents only parts of total benefits, in other words quantitative benefits. As of now, this study is limited to just identify all other qualitative benefits, even though they might be estimated in future further studies.

### **6. Costs**

Costs relating to operating the API system, can be calculated in terms of two different parts, personnel costs and data system-related costs like maintenance and user fee. One thing to note again is that this paper does not include any possible costs burdened to private air carriers.

First, based upon official documents on Korean Civil Servants' pay schedule and numbers of officers working as part of the API system in the Korean Immigration Office, total costs come to

about \$756,000 in 2015. This estimate comes from simple calculation, which actual numbers of workers (about 18) serving in the Korean API section are multiplied by average annual payroll per worker (about \$42,000). Second, unlike personnel costs, user fee and maintenance costs are a little tricky to calculate for the following reasons. As for the user fee, the Korean Immigration Office was supposed to pay about \$1.70 per one flight's data transmission. Given the total numbers of flights, these costs reached up to about \$250,000 per year. However, the API transmission system of related agencies like the Korean Customs Office and the Immigration Office was integrated in 2013. Since then, it has been agreed that the Korean Customs Office takes the burden of paying all user fee. Therefore, user fee-related costs come to nothing for the Korean Immigration Office. Of course, if we estimate all the related costs on the social level, this cost should also be counted for the total costs. However, for the benefit-cost analysis from the Korean Immigration Office, this cost will not be counted into our total costs.

Before moving to calculate maintenance costs for the API system, it should be noted that the API system has been introduced and developed as a part of total 'computerized immigration system' including the introduction of Machine Readable Passport system in Korea. For this reason, all the API system establishment and maintenance costs were incorporated into total efficiency programs. Based upon contracts, the annual costs for total programs' maintenance are estimated to be about \$1,670,000 in 2015. To find out exact shares of the API system-related maintenance costs, this paper resorts to an interview with insider within the Korean Immigration Office who has been closely related to dealing with that contract. Based upon this anonymous source of information, maintenance costs for the API system can be calculated to be about \$167,000.

Summing up, the total costs for operating the API system in 2015 are estimated to be \$923,000 ( $\$756,000 + \$167,000 = \$923,000$ ).

## **7. Total net benefits**

Will it be worth operating the Korean API system in terms of costs and benefits analysis? In this paper, we have been trying to answer this question? Based upon the results of identification and

calculation of costs and benefits, total net benefits come to \$62,600 in 2015(\$985,600 - \$923,000 = \$110,700), as shown Table 3 below.

Table 3. Costs and Benefits of Korean API system in the year of 2015

	Numerical Values(\$)	Total Net Values(\$)
<b>Benefits</b>		
- Reduced Waiting Time for Passengers	911,600	
- Increased detection of Inadmissible Passengers	'Qualitative'	
- Detection of illegally documented passengers in transit area		
: direct effect(avoided fines)	74,000	62,600
: indirect effect(increased credibility)	'Qualitative'	(985,600 -
<b>Costs</b>		
- Personnel Costs	756,000	923,000)
- System User fee	0(since 2013 <sup>1</sup> )	
- System Maintenance costs	167,000	
- Costs to the private air companies	'Hard to track'	
- Possible violation of privacy	'Qualitative'	

Some limitations of this research should be noted before we make conclusions that "Yes, it is net beneficial in terms of costs and benefits." First, this paper concerns about only costs to public sectors, and in particular, the Korean Immigration Office. If we include all other costs, like costs to

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<sup>1</sup> Since 2013, only Korean Customs Office has been paying the API system's user fee, and Korean Immigration Office can share the system for free. This is not transferred fee from one agency to the other in the public sector. In this sense, we decide not to include the user fee in our total costs calculation.

private air carriers and costs from the possible violation of privacy, the net benefits should be decreased from our results. For the system's introduction at least, however, it does not look like a serious burden to commercial company, let alone the adapting costs in the process of the system's operation which could be another topic of research. Before the API system, they were already supposed to report passenger information. Costs from privacy violation remain to be seen, as of now, because it is closely related to actual operation practices and could be minimized with cautious approach. Second, this paper tried to cover the API system costs and benefits in the one single year of 2015. It is mainly because of some technical complexities relating to pin down exact shares of API system establishment which was incorporated into other systems introduction costs. Given the relative low costs out of total API system costs and its long years since its introduction, we believe that this simplified analysis does not hurt overall justifications of this analysis<sup>2</sup>. Lastly, all benefits calculation tried in this paper represents parts of total benefits. This means that many other qualitative benefits should also be considered in decision making process, even though those qualitative benefits are technically too complex to calculate. With these 'qualitative' benefits in mind, the total net benefits should be larger than our results. Facilitated cooperation among law enforcement agencies, increased security and credibility could be some examples of these 'qualitative' benefits.

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<sup>2</sup> Roughly, the API system's initial establishment costs could be estimated to be about \$250,000 which is one tenth of the total project amounting to be \$2,500,000. This conjecture comes from the fact that the API system maintenance costs take up about one tenth of the total system's maintenance costs.

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