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**Article**

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# Study on improvement in logistics industry in Gangwon province: Focusing on Yangyang International Airport<sup>☆,☆☆</sup>

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## ABSTRACT

This study aims to contribute to analyze the logistics competitiveness of Yangyang International Airport and suggest improvement plans for airport logistics experts to use them as basic data to discover the actual factors for revitalizing the Gangwon-do logistics industry. Therefore, the importance and performance level of airport logistics competitiveness factors were investigated and differences were analyzed. The result shows "location", "local cargo demand", "specialized cargo supra-structure", and "government support policy" were surveyed as "focus" areas with high importance awareness but low performance.

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## 1. Introduction

Yangyang International Airport, the only international airport in Gangwon Province, was first proposed for establishment in 1986 for the purpose of replacing and combining airports in Gangneung and Sokcho; its construction was completed in 2001, raising expectations as a replacement and combination airport for Korean East Sea Rim. However, it has been showing very poor usage rates: as of 2017, 179 flights were operated for 15,780 passengers with 168.8 tons of freight handling, while in 2019, 435 flights were operated for 54,283 passengers with 466.1 tons of freight handling. Despite this increase, it is the airport with the lowest usage rate in Korea.

Likewise, the birth of the Yangyang International Airport is the political byproduct of the central government as the Muan International Airport, and it is being shunned in cost and efficiency. It has been regarded as a local airport with difficulties in creating demand.

However, starting with hosting the PyeongChang 2018 Olympic Winter Games, due to the necessity of improvement of daily infrastructure including transportation, surrounding conditions have rapidly improved. For instance, transportation and logistics expanded, such as the expansion of the Yeongdong Expressway, 2nd Yeongdong Highway, and Seoul–Yangyang Expressway, and the opening of the KTX Kyung Kang Line. Further, in 2017 in particular, Fly Gangwon, a

low-cost airline, was launched based on the TCC business model focusing on Chinese inbound tourism demand, having Yangyang International Airport as the mother base. While Yangyang International Airport is experiencing repetition of suspension and return due to uncertainties caused by China's Korean Wave ban against United States Forces Korea (USFK)'s Terminal High Altitude Area Defense (THAAD) system and international trade disputes between the US and China, it still has an inferior position among airports within the nearby region due to the absence of infrastructure, background demand, network, and strategy.

However, the Covid-19 pandemic resulted in rapid decline in air passenger demand, pushing the flight and tourism industry into crisis. As a measure to tackle this, the central government is approving freight transportation services to low-cost airlines after evaluating feasibility, and low-cost carriers are actively utilizing this, discovering opportunities to create new air logistic demand (Logistics Newspaper, 2020).

Ahn (2021) suggested that as a result of analysis on priority policy for the logistics industry in Gangwon province, the strategy for establishing logistics network in Gangwon province, such as the construction of the logistics complex in Donghae region in Gangwon province and revitalization of Yangyang International Airport are the most important. In the perspectives of logistics, it is urgent to revitalize logistics competitiveness of Yangyang International Airport.

Against this backdrop, starting with the PyeongChang 2018 Olympic Winter Games, Yangyang International Airport is expected to have growth potential of air freight logistics, such as improved accessibility to the metropolitan area, increased demand in air freight due to increased marine carriage charge, necessity of

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alternative airport for the passenger and freight of Incheon International Airport, uncertainties with re-spreading of pandemic, and entry into freight transportation business by Fly Gangwon. In particular, it has special merits such as relatively low landing cost compared to the Incheon International Airport, non-existent duration of flight of the airport, convenient access to Seoul and metropolitan area.

Accordingly, the study aims to be utilized as a practical basic material for the revitalization of the logistics industry in the Korean East Sea Rim by analyzing the logistics competitiveness of the current Yangyang International Airport and suggesting ways to improve by applying the Importance-Performance Analysis through the survey of users of the airport logistics,

The study aims to be used as a basic material in order to discover practical factors to revitalize the logistics industry in Gangwon province by analyzing the logistics competitiveness of Yangyang International Airport and suggesting solutions to improvement by surveying the relevant parties of airport logistics at the present moment. Importance-Performance Analysis, extracts and defines the variables for the revitalization of the logistics competitiveness of Yangyang international Airport.

The study consists as follows. Chapter II addresses theoretical review of the Yangyang International Airport, the subject of the study and airport logistics-related matters as well the potential for logistics through the recent changes at Yangyang International Airport. Chapter III introduces the concept of Chapter IV conducts analysis of actual proof based on the results of the Importance-Performance Analysis and suggests implications for the improvement of the logistics competitiveness of the airport. Chapter V is conclusion.

## 2. Theoretical background

Lee (2003) analyzed literature research related to Yangyang International Airport and overseas cases to suggest ways to improve competitiveness of the airport. Cho (2004) analyzed the issues and challenges Yangyang International Airport faces, as well as the transportation infrastructure that influences the airport. He also extracted ways to improve competitiveness and specific practice strategies for revitalization of the passenger demand. Kim et al. (2005) extracted issues of the Yangyang International Airport against the backdrop of the changes in the domestic and overseas airport and surroundings and suggested ways to develop based on the existing literature research. Choi (2008) categorized and analyzed the preceding research and press releases on tourism industry and airport revitalization in terms of issues, methods of revitalization, and information delivery and suggested methods of revitalization of Yangyang International Airport. Gangwon Province (2015) expressed that expansion of foreign visitors' tourism demand through the revitalization of the Yangyang International Airport and linkage with regional income generation method and provided suggestions.

Lee et al. (2017) introduced the TCC (Tourism Convergence Carrier) distinguishable from low-cost carriers and analyzed its impacts on the local economy if it were to be established at Yangyang International Airport.

Hwang (2018) analyzed social network big data on Yangyang International Airport to visualize the trend of airport customer service. As a result, it was suggested that Yangyang International Airport should pursue policies focusing on geography, airport advertisement, accessibility to nearby airports, information on connectivity with neighboring tourism destinations, linkage with the winter Olympic tourism, and accommodations.

So far, there have been a few studies on the revitalization and establishment of functions of Yangyang International Airport. However, basic material and research on the revitalization of the logistics competitiveness of Yangyang International Airport

reflecting the conditions of the freight logistics market since Covid-19 is urgent.

While there have been few studies that clearly define and suggest the factors of domestic and overseas airports' logistics competitiveness, there have been studies on air freight forwarders' airline choice factors (Moon & Ha, 2009; Song & Kim, 2015), service quality of air cargo (Jun & Hong, 2004; Adler & Berechman, 2001; Hong et al., 2021), revitalization of air cargo (Song, 2020), and cargo airlines' choice of airports (Bakhitiyorjon & Lee, 2017).

While the study on the competitiveness of airport hub is considered similar to the logistics competitiveness of the airport. As examples of domestic and overseas key studies, Tae-won Jeong and Min-young Park (2005) extracted the factors of airport cargo competitiveness and conducted analysis of Incheon International Airport's air cargo competitiveness. The airport cargo competitiveness was divided into six factors, including cargo service, cost, location, operation capacity, supply capacity, and brand.

Lee et al. (2007) determined and suggested the factors of Porter's industry competitiveness such as supply demand, related supporting industry, strategy, organization, and competitiveness structure as the conditions for the improvement of an airport's hub competitiveness.

Park et al. (2006) conducted evaluation of competitiveness between key airports in Asia and suggested, as the key competitiveness factors, the geographical characteristics, accessibility to the airport, environment issues, conditions for operation for airline companies, social and economic ripple effect, neighborhood of airports, service fee, plan's feasibility, airport operation technology, and airport facility.

Lee (2013) reviewed the feasibility of future expansion of international routes and construction of new airport through the study of Gimhae International Airport's transportation status. She argued that there is a close relation between the increase and decrease of the flight passenger and air cargo and the operating routes and their frequencies.

Kim and Chung (2013) evaluated the competitiveness of Incheon Airport's logistics hub by classifying the strategy factors by strategy characteristics and developed a strategy evaluation model. They divided the competitiveness strategy of logistics hub into factors of increased transshipment cargo and end-of-the-line cargo. They suggested the detailed factors for the logistics hub, such as demand, service, facility, space, administration and operation, and policy.

As the determinant factors of the demand of Incheon International Airport's import cargo, Lee and Park (2021) suggested shipping cost, frequency of operation, GDP, trade value, market share, and oil price. Their findings suggested that the meaningful impacts were shown in the order of income and shipping cost, policy, competition, type of cargo, and supply capacity.

When looking at the overseas studies, Gillen et al. (2010) and Asch et al. (2019) classified and suggested the air cargo logistics competitiveness of European airport into geographical factor, air cargo market factor, airport operation factor, and market differentiation factor. For the geographical factor, position, demand in local air cargo, and airport's air cargo capacity were suggested. For the air cargo market factor, large-scale forwarder, existence of airlines, capacity of large carriers, and passenger flight's air cargo capacity were suggested. For the airport operation factor, operation hours, cost, network, and traffic accessibility were suggested while for the market differentiation factor, awareness and recognition, marketing, possibility for development, and specialized cargo handling system were suggested.

Chao and Yu (2013) suggested as the competitive factor of air cargo, airline's capacity, airport facility, airport operation capability, and economic development factor. They conducted comparative evaluation of key Asian airports.

Larrodé et al. (2018) suggested as the following airport's air cargo revitalization factors: economic factor, logistics operation factor,

technology factor, social, legal, and environmental factor. They applied AHP decision making technique on air cargo logistics experts to evaluate priority factors. Further, they evaluated logistics competitiveness of Spain's Zaragoza airport.

In order to evaluate the airport's logistics competitiveness, the above preceding research extracted key competitiveness factors to analyze efficiency of competing airports, and measured and compared their service quality.

However, while preceding research evaluates or measures logistics competitiveness of large hub airports or general airports, the present study is different in that it provides specific suggestions such as changes in factors of what area are required and how much change is required for the revitalization of Yangyang International Airport, a popular but inefficient local airport, for it to improve competitive advantage in air cargo attraction among competing airports.

Yangyang International Airport was constructed to replace Sokcho Airport, the facilities and location of which are inadequate, and Gangneung Airport which fails to meet safety standard due to its limited landing zone facilities. It was aimed to become a base airport in the East Sea Rim, attracting foreign visitors mid-to-long term by utilizing the tourism resources of the East Sea region, promoting balanced regional development, and preparing for unification, including Mount Kumgang tourism and exchange between North and South Korea. A brief summary of facilities and operations of Yangyang International Airport (< Table 1 >) is as follows:

- Location: 201, Gonghang-ro, Sonyang-myeon, Yangyang-gun, Gangwon-do, Republic of Korea.
- Size of facility: land 2474 km<sup>2</sup> (750 thousand pyeong), runway 2500 m × 45 m.
- Capacity: take-off and landing 43,000 times annually (118 times per day), 3170,000 passengers (8685 passengers per day), four simultaneous flights (B737), 498 simultaneous parking.
- Convenience facilities: duty-free shops, convenience stores, ATM, souvenir shops.
- Domestic lines: Yangyang–Daegu, Yangyang–Jeju, Yangyang–Yeosu.
- International lines: Yangyang–Bangkok, Yangyang–Clark Field (Philippines, estimated by June 2022).

Recently Yangyang International Airport is experiencing improved traffic accessibility to the metropolitan and south east area thanks to the launching of KTX Kyung Kang Line, the 2nd Youngdong

Highway, Seoul–Yangyang Expressway, East–west Express Rail, and Donghae Line. Further, the airport is securing logistics competitiveness thanks to the expansion of the cargo business by the low-cost carrier Fly Gangwon, the mother base of which is at the Yangyang International Airport. Below is a summary of the recent logistics business developments of Yangyang International Airport.

- December 2021, logistics subsidiary Fly Gangwon CARGO was established, purchase of sites for cargo business near the airport
- January 2022, business license issued from the Ministry of Land, Infrastructure, and Transport for cargo transportation
- March 2022, Fly Gangwon's contract to lease mid-to-large sized carriers, A330-200
- Gradually introducing a total of seven carriers (four passenger planes and three cargo planes) of the same model by year 2025 to transport 900,000 overseas passengers and 120,000 tons of international freight annually
- May 2022, acquiring of traffic rights for Sanghai, China (twice a week) and Chengdu (twice a week) (it was already in possession of traffic rights in Beijing and Changchun)
- Return twice a week for Clark in Philippines and Bangkok in Thailand in June; Taipei in Taiwan and new destinations, such as Hongkong and Macau, are planned in July
- Plans for departure in key cities such as in Vietnam, Japan, China, and Ulaanbaatar, which requires transport rights
- Cargo terminal at Yangyang International Airport's completion scheduled by the end of August, 2022
- As illustrated, Yangyang International Airport is experiencing dramatic improvements in both the neighboring economic conditions as well as accessibility to the airport starting from PyeongChang Winter Olympic Games. Further, the potential for logistics at Yangyang International Airport is expected as the demand for air cargo increases and Incheon International Airport is expected to become more congested, giving rise to calls for an alternative airport

### 3. Methodology and framework

Importance–Performance Analysis (IPA) is a popular marketing analysis technique that evaluates each attribute's importance prior to use and performance after use to measure the users' performance on products or services. It simultaneously compares and analyzes each attribute's relative importance and performance. Its analysis and interpretation are convenient and, therefore, widely used in practice.

Likewise, IPA has been applied to the studies to improve competitiveness and service quality of logistics facilities such as ports, airports, and logistics warehouses as well as logistics companies. Within Korea, studies by Bang and Kim (2006), Rho and Kim (2007), Jeong and Koh (2009), Lee et al. (2013, 2015a, 2015b), and Ahn et al. (2020) have applied Importance–Performance Analysis (IPA).

As shown in < Fig. 1 > below, the average value of each factor is marked on the two-dimension coordinates with performance level on the X axis and importance level on the Y axis. Generally, the factors marked in the quadrant can be defined as below:

1st quadrant refers to areas with high importance level but low performance level, requiring focused management;

2nd quadrant refers to areas with both high importance and performance level, requiring sustainable strategy;

3rd quadrant refers to areas with both low importance and performance level that can have lower priority;

4th quadrant refers to areas with low importance but high performance level, requiring strategy to remove unnecessary excessive management or improvements.

The purpose of this study is to suggest competitive factors for revitalization of Yangyang International Airport's logistics

**Table 1**  
Performance at Yangyang International Airport.

		Supply (seat)	Frequency (flight)	Passenger (person)	Cargo (tonnage)
2015	Domestic	12,752	68	9013	52
	International	125,239	750	106,620	1184
	Total	137,991	818	115,633	1236
2016	Domestic	738	5	417	1
	International	104,151	606	87,747	887
	Total	104,889	611	88,164	888
2017	Domestic	–	–	–	–
	International	22,243	179	15,780	169
	Total	22,243	179	15,780	169
2018	Domestic	867	6	119	3
	International	51,382	335	37,533	466
	Total	52,249	341	37,652	469
2019	Domestic	16,182	87	11,214	50
	International	43,401	261	32,305	356
	Total	59,583	348	43,519	406
2020	Domestic	223,665	1195	111,501	475
	International	27,432	154	14,718	158
	Total	251,097	1349	126,219	633
2021	Domestic	223,347	1189	102,344	471
	International	–	–	–	–
	Total	223,347	1189	102,344	471

Source: Airportal website airport statistics(<http://airport.co.kr>)

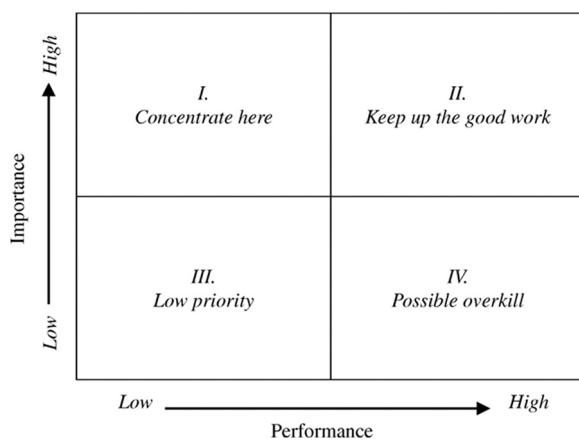


Fig. 1. Importance–Performance Analysis.

competitiveness that are deemed to be highly important (Ahn, 2021) among the policy factors for the improvement of the logistics industry in Gangwon Province. To achieve this, the airport's logistics competitiveness factors must first be organized. For this, as a result of reviewing preceding research, the definitions of the variants applied for the purpose of the study shippers and air freight forwarders' factors in determining airlines, evaluation factors for airport's air cargo competitiveness, airport efficiency, and service quality factors are inappropriate for use with the unified standards in the perspectives of airlines, air freight forwarders, or airports. They are also too mixed to be grouped. Therefore, it is considered unsuitable for the logistics competitiveness of Yangyang International Airport, the subject of the study,

Therefore, in order to evaluate Yangyang International Airport's logistics competitiveness factors, the study comprehensively reviewed Chung and Park (2005) argue that the factors for Incheon International Airport's logistics hub, Asch et al. (2019) and Gillen et al. (2010), analysis of airport logistics competitiveness factors of airports in Europe, Larrodé et al. (2018)'s study evaluating Spain's Zaragoza Airport's logistics competitiveness factors. This study organized the factors for revitalization of Yangyang International Airport to be applied to the study in < Table 2 >.

Table 3 organizes the characteristics of respondents who were surveyed for the evaluation of importance and performance level of factors in order to extract the competitiveness factors for Yangyang International Airport to cultivate competitive advantage in air cargo. Survey respondents were specialists who well understand the airport's logistics process and who can well evaluate the airport's logistics competitiveness. That is, the respondents were 36 experts with years of experience as air cargo forwarders, airports corporation, airline freight staffs, shipper companies export personnel, customs agents, who were contacted through emails over a two-week period (November 2, 2021 to November 16, 2021). Thirty-six copies of the survey were used for analysis.

#### 4. Result

Analysis of results shows that, in the case of Yangyang International Airport's logistics competitiveness factors, experts considered the followings as important in the following order: accessibility to the airport, airport connectivity, government support policy, location, local demand, air cargo capacity, and specialized cargo supra-structure. For the performance level, the factors were airport cost, airport operational time, airport connectivity, airport

accessibility, forwarders' presence, and airport reputation (< Table 4 >).

Further, t-test result was conducted for the difference between the importance and performance level by each logistics competitiveness factor. As a result of analysis, for all factors, there was meaningful statistical difference between importance and performance level. In particular, the importance–performance differences were big in the order of airport accessibility, airport connectivity, government support policy, location, local demand, specialized cargo supra-structure, presence of wide-body capacity, and full freighter capacity.

The 2nd quadrant of the “sustainable” area, where both importance and performance level are high, is being well-managed and has factors that are good to continue maintaining as they are. The 1st quadrant of the “focus” area has high levels of importance but low levels of performance, showing factors that need improvement in performance level in the first place. The 3rd quadrant of “low priority” areas, has low levels of both importance and performance and has factors that do not require improvement. The 4th quadrant of “excessive” area is where excessive energy is invested in unimportant matters and it is recommended to switch the efforts into other factors (Pyo, 2009).

The 1st quadrant is the “focus” area where the importance level is high but performance level is low and examples are “location,” “local demand,” “specialized cargo supra-structure,” and “government support policy.” The factors included in this area, which are “geographical factor” and “differentiation factor,” need improvements in performance level as a priority. In particular, the “location” factor is improving thanks to continuous expansion to metropolitan and south east area. However, given the industrial structure of Yeongdong area, creation of the area's air cargo demand is yet to be realized. In the case of Korea's popular Incheon International Airport, in order to create demand for air cargo, Incheon International Airport Corporation led the purchase of land near the airport to utilize it for the airport's logistics complex and is providing import and export companies incentives for attracting new growth in air cargo. In the case of Yangyang International Airport, Gangwon Province, Fly Gangwon, and Korea Airports Corporation need to lead in establishing a systematic and strategic mid- to long-term approach to create the region's air cargo demand. In particular, for the airport logistics network to expand and stabilize, origin–destination cargo should be secured. Accordingly, based on the expanding traffic network, conversion of industrial structure for creation of local cargo demand and business attraction strategies are required.

The 2nd quadrant is the “sustainable” area, with both high importance and performance level and includes “airport connectivity” and “airport accessibility.” Competitive factors included in this area are well operated and, therefore, only require continuous maintenance. However, Yangyang International Airport's passenger flight network stabilization is required in advance in order to maintain the flight frequency and flight network level. Therefore, continuous discussion with key cities (countries) in East Asia to secure rights of transport for new and major routes is required. Therefore, Gangwon Province, Fly Gangwon, and Korea Airports Corporation should maintain close relations with the Ministry of Land, Infrastructure, and Transport and closely review whether the standard for the distribution of right of transport for international airports is met.

The 3rd quadrant is the “low priority” area, with both low levels of importance and performance. The competitive factors in this area do not require improvement. Therefore, it is necessary to identify the changes of importance level of the airport logistics users regularly and improve performance levels accordingly.

The 4th quadrant is the “excessive” area, where importance level is low but performance level is high; it includes factors such as “forwarders' presence,” “full freighter capacity,” “airport operational



**Table 2**  
Definition of airport logistics competitiveness factors.

Factor	Sub-factor	Description	Source
Territory	Location	Air cargo is usually used for time-sensitive goods (e.g. e-commerce and pharmaceuticals), valuable items and perishables. This illustrates the relevance of a central location of an airport for hub activities: minimizing flying time and costs	Gillen et al. (2010); Asch et al. (2019)
	Local Demand	Yangyang airport do not act as hubs and are, therefore, almost fully dependent on the local market. It is important for local airports to be located close to an economic cluster because it is an indication of higher demand. And air freighter operations will be located where sufficient local demand is generated.	Asch et al. (2019); Larrodé et al. (2018)
Cargo Market Place	Air Cargo Capacity	Slot allocation is a major issue at the vast majority of major airports. Most of airports try to allocate slots as much as possible to passenger flights because they generate higher income	Asch et al. (2019)
	Freight Forwarders' Presence	Important role of freight forwarders in the air cargo market. Therefore, having huge freight forwarder present at the airport is said to be beneficial for the airport to attract cargo business	Asch et al. (2019); Larrodé et al. (2018)
	Integrators' Presence	Almost all of the top cargo airports in Europe have an integrator as one of their major cargo carriers. Integrators – DHL, FedEx and UPS – are fully integrated logistics service providers that operate their own or wet-leased aircraft.	Asch et al. (2019)
	Presence of Wide-body Capacity	Approximately 50% of airfreight is carried via the bellyhold of wide-body aircraft, and this share will probably increase further in the future. Wide-body aircraft have also become increasingly important for the air cargo market in the last couple of years as the new wide-body aircraft built by Boeing and Airbus are better designed to carry a larger amount of cargo in their bellies.	Asch et al. (2019)
	Presence of Full Freighter Capacity	All-cargo airlines have difficulties in obtaining slots at major gateways. On some air routes, the belly capacity of wide-body aircraft does not match the demand and full freighters could cater for this additional demand. Passenger flights, full freighters have to deal with unbalanced cargo flows and, therefore, often operate triangular routes.	Asch et al. (2019)
Airport Operations	Airport Operational Time	Airports with 24-hour operations as more suitable to attract dedicated cargo traffic and suggested that airports with 24/7 operations have a competitive advantage over others for this type of services. Night-time operations are very important for airlines serving regional airports, whereas airlines active at major European airports are able to schedule their operations around the night-time restrictions.	Gillen et al. (2010); Larrodé et al. (2018); Asch et al. (2019)
	Airport Costs	Airlines take into account when choosing a particular airport are the airport costs or airport charges. Minimizing the total cost of operations is very important for cargo operators. Lower airport charges are a common reason for the relocation of full freighter flights.	Asch et al. (2019); Larrodé et al. (2018)
	Airport Connectivity	Airport connectivity is a key element in the airport choice for cargo operations. Flight frequency and flight connectivity were almost always mentioned in research about the airport choice for cargo activities. A wide network of flights goes hand-in-hand with a high availability of cargo transport. To attract transshipment cargo to an airport,	Asch et al. (2019); Larrodé et al. (2018)
	Airport Accessibility	Air transport has inevitably a multimodal character, most often combined with road transport to and from the airport. Good accessibility by road helps guarantee fast delivery, which is vital for air cargo. Smaller airports specializing in freight should pay particular attention to good road accessibility	Asch et al. (2019); Gillen et al. (2010); Larrodé et al. (2018)
Product Differentiation	Airport Reputation	The importance of a good reputation with respect to air cargo. A good reputation reduces the uncertainty concerning the quality of collaboration between airline and airport	Asch et al. (2019)
	Airport Marketing and Business Development Specialized Cargo Supra-Structure	Airports could attract freighter operators by "intensive competitive strategies and aggressive marketing strategies". The necessity of specialized loading and transfer equipment to support sustainable cargo activities at an airport. that modern transportation, communication, and logistics systems are essential to become an air cargo hub	Asch et al. (2019); Larrodé et al. (2018) Asch et al. (2019); Larrodé et al. (2018); Gillen et al. (2010)
	Government Support Policy	The good performance of Hong Kong Airport and Singapore Airport in the cargo segment in 2006 to the fact that both governments listed the development of the logistics industry as one of their top priorities.	Larrodé et al. (2018)

Note: The government support policy factors were added and redefined to the airport logistics competitiveness factors suggested in the study of Asch et al. (2019).

**Table 3**  
Characteristics of respondents.

Classification	Number of respondents	Percentage (%)
Forwarder	7	19.4
Airport corporation	3	8.3
Shipper	8	22.2
LCC	7	19.4
Logistics Operator	5	13.9
Customs agent	6	16.7
Total	36	100.0

time," "airport cost," and "airport reputation." Therefore, it is necessary to distribute the resources and capacity in this area into strengthening the factors in the 1st quadrant's focus area. Yangyang International Airport currently enjoys high level of performance due to the plans to continuously introduce air cargo carriers and mid-to-large passenger flights as well as extra slot capacity and low airport cost compared to competing airports. However, for future improvement of logistics competitiveness requires not only the cargo accommodating capacity, but also the airport's logistics marketing strategy. [Table 5](#).

**Table 4**

T-test result for difference between the importance and Performance level.

Sub-factor	Importance		Performance		Importance-Performance	
	Average	standard deviation	Average	standard deviation	Difference	P-value
Location	7.04	1.546	3.83	1.685	3.217	0.00
Local Demend	7	1.615	3.83	1.494	3.174	0.00
Air Cargo Capacity	6.83	1.403	3.87	1.541	2.957	0.00
Freight Forwarders' Presence	6.22	1.841	4	1.865	2.217	0.00
Integrators' Presence	6.61	1.608	3.61	1.467	3	0.00
Presence of Wide-body Capacity	6.65	1.71	3.65	1.433	3	0.00
Presence of Full Freighter Capacity	6.52	1.638	4	1.642	2.522	0.00
Airport Operational Time	6.52	1.612	4.35	1.521	2.174	0.00
Airport Costs	6.3	1.545	4.39	1.343	1.913	0.00
Airport Connectivity	7.87	1.191	4.09	1.586	3.783	0.00
Airport Accessibility	7.96	1.042	4.09	1.64	3.87	0.00
Airport Reputation	6.04	1.233	4	1.588	2.043	0.00
Airport Marketing and Business Development	5.91	1.38	3.87	1.329	2.043	0.00
Specialized Cargo Supra-Structure	6.83	0.916	3.7	1.231	3.13	0.00
Government Support Policy	7.22	1.641	3.7	1.653	3.522	0.00

**Table 5**

Results of "importance-performance analysis" of logistics competitiveness factors at Yangyang International Airport.

Factor	Sub-factor	Average	standard deviation	Average
Territory	Location	7.04	3.83	1st quadrant
	Local Demend	7	3.83	1st quadrant
	Air Cargo Capacity	6.83	3.87	1st quadrant
Cargo Market Place	Freight Forwarders' Presence	6.22	4	4th quadrant
	Integrators' Presence	6.61	3.61	3rd quadrant
	Presence of Wide-body Capacity	6.65	3.65	3rd quadrant
	Presence of Full Freighter Capacity	6.52	4	4th quadrant
	Airport Operational Time	6.52	4.35	4th quadrant
Airport Operations	Airport Costs	6.3	4.39	4th quadrant
	Airport Connectivity	7.87	4.09	2nd quadrant
	Airport Accessibility	7.96	4.09	2nd quadrant
	Airport Reputation	6.04	4	4th quadrant
Product Differentiation	Airport Marketing and Business Development	5.91	3.87	3rd quadrant
	Specialized Cargo Supra-Structure	6.83	3.7	1st quadrant
	Government Support Policy	7.22	3.7	1st quadrant
	Total Average	6.77	3.93	

## 5. Conclusion

This study is intended for use as basis for discovering practical factors to revitalize the logistics industry in Gangwon province by analyzing the logistics competitiveness of Yangyang International Airport and suggesting means of improvement by surveying the relevant parties of airport logistics at the present moment.

Accordingly, the importance and performance level of the factors of airport logistics competitiveness and analyzed their differences. The result indicates that the areas of "focus" where perceived importance was high but performance level was low were "location," "local demand," "specialized cargo supra-structure," and "government support policy." The result also indicates that it is urgent to come up with solutions to improve the performance level of the factors in the "focus" areas.

The study suggests the followings based on the analysis result.

Yangyang International Airport located in the Yeongdong area experiences difficulty in creating demand for local air freight due to the characteristics of the regional industry's structure, thereby requiring a mid-to-long-term approach. It needs to establish mid-to-long-term air freight demand creation and continuously discover and attract demand for new growth in air freight by referring to domestic and overseas local airport's logistics cases.

Further, since there are limitations to improving logistics competitiveness of the Yangyang International airport with only the investment and capacity of private low-cost airlines, Korea Airports

Corporation and the Ministry of Land, Infrastructure, and Transport, together, should establish a systematic mid-to-long-term strategic approach for the creation of air freight demand in the region. For this, based on the expanded traffic network, there should be research and support for long-term attraction of air freight which encompasses conversion of industrial structure for the creation of air freight demand in Yeongdong region and strategies to attract related businesses. In particular, as the high value small-volume and urgent air freight of is increasing, it is necessary to conduct preceding research on how to define and target Yangyang airport's air freight and how to establish the connected transportation system.

In addition, previous research and support policies on Yangyang International airport have been focusing on the approach of passenger and tourism demand creation. However, since the recent end of the pandemic, while the importance of air freight is increasing due to the changes in the environment of the air freight logistics industry, the policy must transition from the existing attraction of foreign travelers to air freight.

Therefore, the establishment of a public-private partnership with the control tower to strengthen the logistics competitiveness of Yangyang Airport mentioned above must be preceded.

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