Evaluating GSE pooling for success in airport ground handling operations

Introduction

Global GSE pooling context

Ground Support Equipment (GSE) vehicles provide the necessary movement of people, cargo, baggage and the aeroplane itself for any flight to be made possible. Essentially, there always needs to be the right amount of the right ground support equipment available to perform specific service functions for each and every flight to ensure an on-time and smooth operation and minimise any delays or disruption to airlines and their customers.

As global air traffic increases, and passenger numbers now exceeding pre-Covid levels (around 5 billion passengers), the volume of GSE at airports globally is expected to increase with further demand. The global GSE fleet is estimated at approximately half a million units today, and the global installed base is expected to grow further, driven by expansion of the global aircraft fleet and airport operations, and could reach over 600,000 units globally by 2035[1].

Legacy GSE operating models, where ground service provider companies, airports and airlines own or lease, and operate their own equipment, have typically provided reliability. However, in some cases, redundancy built into legacy GSE fleets has resulted in surplus equipment remaining idle and unproductive for up to half of the time[2].

Excess GSE on the apron is also compounded by the early delivery of additional assets needed for peak season (delivered months in advance), but remain redundant while being paid for in the interim period. This approach also ties up significant CAPEX, and drives maintenance spend (OPEX) for the ground services provider, From an airport authority perspective it leads to unwanted apron congestion and wider inefficiencies that impact on overall airport operational performance.

There has been an increasing interest from airports in optimising their apron operations to minimise congestion and improve movement efficiencies on the ramp, which ultimately increases stand capacity, protects on-time performance, minimises safety risks and incidents, and reduces overall carbon emissions.

The typical pooling set up aims for a 'formula 1 pit-stop' style of approach that is facilitated by GSE (such as belt loaders, baggage tractors, passenger steps, ground power units and pushback tractors) being dedicated to each aircraft standard used by the ground services provider, which minimises movement and optimises the utilisation of the GSE by ensuring that the right type and quantity of equipment is always in the right place at any time[3].

London Luton Airport adopted this model from 2017, which has evolved to yield significant improvements to on time performance, safety standards, apron congestion and operational costs ultimately benefitting all stakeholders, and similarly Hong Kong International Airport, who began the GSE pooling initiative in 2018, have reported comparable benefits to date.

One of the reported key benefits of pooling is the facilitation of the transition to electric GSE (eGSE)[4]. As discussed in ICF's recent paper—How the transition to electric GSE is clearing the path for new opportunities at airports globally—the evolving landscape is increasingly driving towards electrification and the electric GSE trend is seemingly yielding more than merely satisfying a sustainability requirement, since potential new commercial, operational, and technological opportunities are emerging as new pathways for airports as a result[5].

Key assumptions

Following our analysis and insights gained from industry sources, ICF's view is that the below key assumptions are the main addressable areas which GSE pooling can significantly improve (primarily from the airports' perspective):

- **Congestion and redundancy:** A GSE fleet installed to meet more than peak demand can result in significant surplus GSE on the airside apron, which creates airport congestion, increases emissions, maintenance, and employee engagement time. Congestion alone has been reported to be a consistent reason for sub optimal on-time performance by causing delays[3,2].
- **Operational quality and standards:** Inconsistent standards for GSE (e.g., safety features and specifications) across decentralised GSE fleets at airports can increase the risk of incidents (aircraft damage, personal injury)[6].
- **Sustainability impact:** Sub-optimal oversight and management result in excessive GSE idle times, producing emissions. Coupled with aging assets (due to the absence of minimum age standards), the impact on airport sustainability agendas is significant[2,7,8].
- **Cost implications:** CAPEX outlay for GSE is significant, and lifecycle management costs (maintenance organisation, fuel, administration) further compound the financial burden for ground handling businesses. This issue is particularly pronounced when considering short-to-medium term airline customer contract wins and losses at a particular airport[2,9].

Methodology and approach

While there have been a number of previous papers and reports on the GSE pooling topic, the aim of this paper is to develop a broader understanding and balanced view of pooling from across the airport operating community, focused on the following key aspects:

- Outline current insights into different GSE Pooling models at different airport types.
- Provide an analysis of actual operational performance (based on key facts gained from data and case study reports).
- Highlight key challenges, and benefits, of GSE pooling based on key industry stakeholder experience and insights (with the aim of creating a holistic and balanced overview).
- Understand the conditions under which a GSE pooling model would be successful, specific to the nuanced airport operating environments, and outline strengths and weaknesses for each respective stakeholder's future consideration.

GSE ownership and pooling models overview

Legacy GSE ownership

Ground handling service providers, airlines, and airports have typically owned or leased their GSE, which in either scenario results in the GSE being under their direct control (from an operating, maintenance and lifecycle management perspective). However, this conventional approach appears, in some cases, to present some challenges for the overall airport ramp operation itself, particularly surrounding efficiencies, congestion, safety and optimal operational performance. These issues are further pronounced when several ground handling service providers are operating at an airport[2,3].

A ground handling operation will essentially need to be resourced to meet peak demand, and off-peak operations can result in substantial GSE redundancy and significant underutilisation, leading to unnecessary congestion, emissions and employee engagement time. Although conversely, where GSE is not decentralised but instead pooled under a shared scheme operated by an airport, there is a potential perceived lack of control from the ground handler in ensuring quality and standards, operational integrity and service delivery, which also potentially erodes their competitive advantage in their proposition to airline customers[2].

GSE pooling

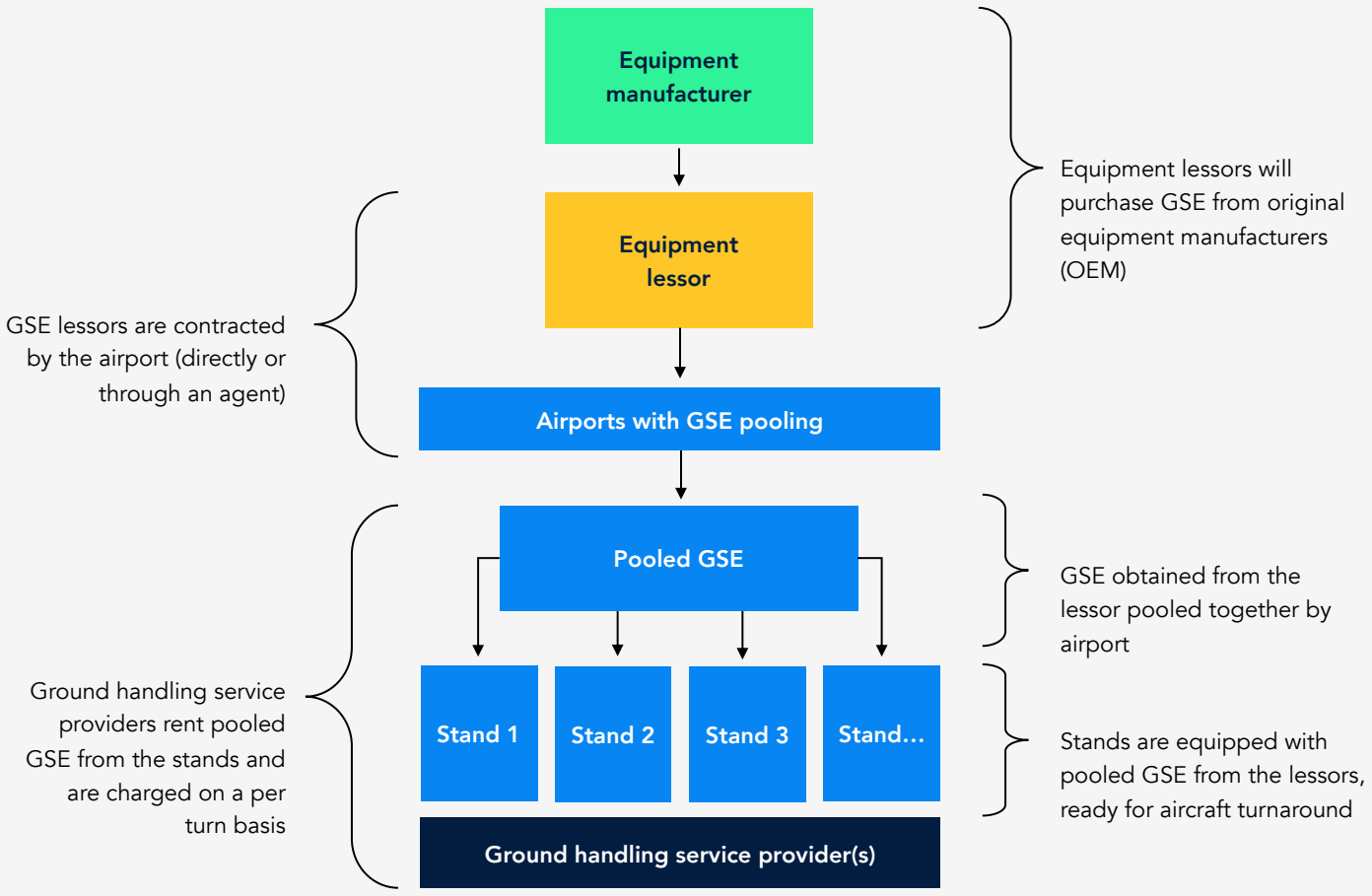
GSE Pooling has its roots in the full-service leasing (FSL) model, where the equipment operator (i.e., ground handling service provider, airline, airport) outsources its GSE requirement to a GSE lessor who provides the assets under a full-service rental agreement for a fixed term that includes all maintenance (with exclusions for damage). However, under the GSE pooling concept the ground handling service provider does not have direct control of the assets but instead shares the equipment with other users, which by design is intended to reduce duplicated ground handling service provider owned fleets, improve safety, utilisation, and overall operational integrity. Ultimately, the airport authority works with the stakeholders to determine and agree the number of GSE assets to be included in the pool. This begins by forecasting against aggregated airport demand of air traffic movements (ATMs), and then underpinning operating procedures through a governance structure, which also ensures that common use assets are available where and when they are needed.

In terms of the approach towards GSE pooling, there are two emerging models that are being realised as successful, which are essentially based on the ownership of the assets, operating conditions, and commercial arrangements. The first model includes a GSE lessor (whom the airport authority will appoint as the sole provider of the GSE) [2, 10, 11] and the second model is where the airport authority directly owns the assets that are leased to the ground services provider/equipment operator [2, 12, 13].

GSE pooling model #1

Under this model, the airport sets the operating framework, scope, service expectations, conditions of use, and to a certain degree also define the contractual arrangements. The GSE lessor funds, procures, maintains, and manages the pooled assets that the ground handling service provider would access under a clearly defined pool user agreement. The typical arrangement of this pooling model shifts the onus of procuring the equipment from the ground handling services provider to the GSE lessor, who has complete ownership of all GSE deployed within the pool. The ground service providers' act only as the operational users of the equipment who are charged on either a per aircraft turn basis, or monthly based on the split and their share of expected volume (which is then reconciled at the end of the operating season or annually)[2].

To that end, the lessor assumes the sole responsibility for providing the appropriate GSE, and sufficient quantity of serviceable equipment by family type (which is agreed as explained above, and optimised based on overall ATMs at the airport and split between the ground service providers' share of ATMs), to ensure that the total GSE pool meets the airport's aircraft turnaround demand consistently over time (as shown in the table below)[2]:



GSE pooling model #2

Model #2 places the airport authority in the centre as the direct owner of the pooled GSE, which for them essentially means ownership obligations such as investment responsibility, and operational accountability (in terms of availability and serviceability of GSE). The airport procures a defined scope of common-use assets, sets the required specification and standards, and makes the equipment available to licensed ground handling service providers under an access and rental charging arrangement, which is generally on a fixed rental rate per use. The commercial and operational agreements are directly between the airport and the ground handling service provider rather than through a GSE lessor, which also allows the airport to treat core GSE as shared airside infrastructure, with stronger direct control over standardising fleet size, asset age and condition, safety specifications, and further enhancements such as telemetry and electrification.

Under this model the airport funds (CAPEX and OPEX) and coordinates much of the enabling ecosystem that would otherwise sit with either the lessor or individual ground handling service providers. Therefore, the airport authority funds the charging infrastructure, provides dedicated GSE maintenance workshop functions (either in house or outsourced to a third-party maintenance provider), training, and establishes operational control centres. As such, the airport assumes greater responsibility for ensuring that the pooled assets are available, maintained, safe, and fit for purpose, supported by clear rules on access, serviceability, damage, defect reporting, and performance oversight.

GSE pooling stakeholder agreements

For the pooling model to be successful, each stakeholder's role and responsibilities must be specifically carved out in terms of both contractual obligation and operational governance.

In the case of the first model, once the pooling contract has been awarded to the successful GSE lessor, Pool Framework Agreements (PFAs) are then formed between the lessor and the airport authority that outline the assets to be provided, quality and standards and operational KPIs for a fixed term.

Pool User Agreements (PUAs) are then established between the GSE pooling lessor and each ground handling service provider operating at the airport which determine the rules of use, operator obligations, insurance requirements, damage and performance management, and incident escalation processes. They also set out the health and safety responsibilities of each party (e.g., the lessor is responsible for the quality and standards of the GSE, regulatory and maintenance compliance, and the ground handling service provider for appropriate operation in accordance with airport, OEM, and industry standards).

Once the above agreements are in place then the airport authority will issue a Provider License (PL) to the ground handling service provider, which sets out the commercial and operational terms, and duration of the operating license.

The below diagram provides an illustrative view of the structure of the typical GSE pooling agreement, and relationship between the stakeholders[2]:

It's important to note that typically there are phased approaches (as outlined in the case studies below) to ramping up to the desired type and quantity on GSE under this model, determined by the degree to which GSE pooling is deemed appropriate for each respective airport[12, 14].

While the airports' appetite for achieving the highlighted benefits of pooling is increasing on a global scale, nuances at airports (the dynamics
of their respective operations) wouldn't necessarily warrant a 100% pooling approach. For instance, several global airports do pool GSE, although in some cases only a specific category or GSE type is included (such as only non-motorised assets), which is deemed most appropriate for the respective operation[3].

Use case analysis

Two case studies show that GSE pooling can deliver tangible operational benefits when it is implemented as a structured airport-wide operating model rather than simply a fleet-sharing arrangement. Both London Luton Airport and Hong Kong International Airport used pooling to address common airside challenges (congestion, equipment duplication, inconsistent standards, and pressure on turnaround performance) while also creating a stronger foundation for future electrification.

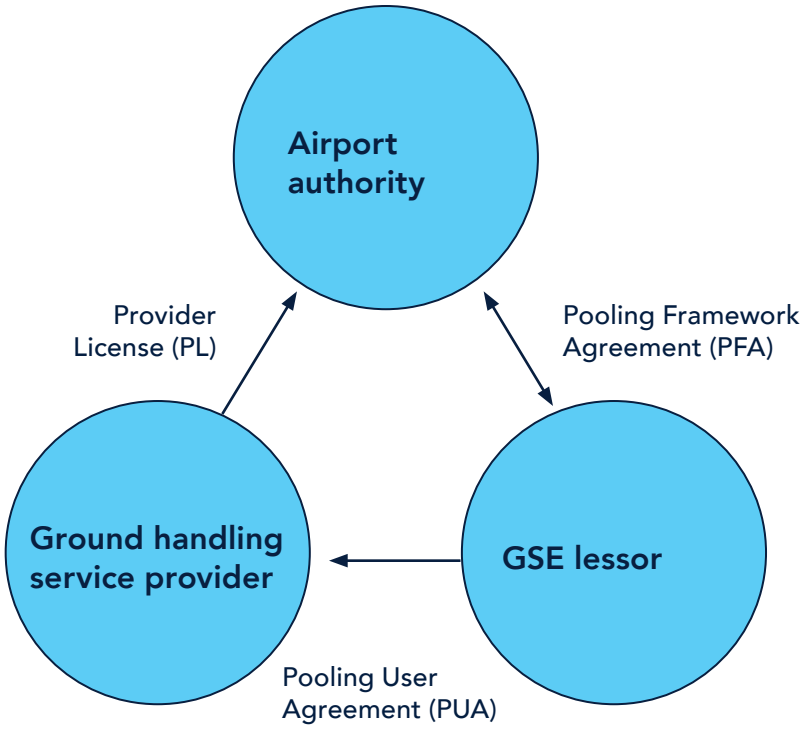
London Luton Airport (LLA)

Motivation

London Luton Airport explored GSE pooling to address growing apron congestion, safety concerns, flight delays, and the operational burden associated with overlapping ground service provider owned fleets. With performance pressure mounting and future traffic growth expected, the airport needed a way to improve stand efficiency, raise equipment standards, and reduce operational friction[15].

Compounding this was that a large proportion of the GSE in operation at the airport was fully depreciated, aged equipment that brought reliability into question. The immediate need for a replacement program would also mean a significant CAPEX outlay for the ground service providers[2, 14].

Example of GSE Pooling Stakeholder Agreement Structure (Model #1)



Approach taken

Adopting the GSE Pooling Model #1, LLA led the initiative by identifying the GSE categories creating the most congestion. Between May to August 2015, the airport trialed the shared use of specific GSE: steps, ground power units (GPUs), baggage belts, passenger integrated guidance systems (PIGS), chocks, and cones. Given that the majority of same aircraft types operated to LLA and therefore the same GSE types were required to handle the turnaround, the trial was primarily dedicated to five of its busiest stands.

The feasibility and concept of the pooling was proven (by stakeholder consensus), and the airport moved to a mandated pooling model, which included the appointing of a single GSE leasing provider (TCR). The first of the pooled GSE was rolled out in January 2017. The implementation was supported by clearly defined user agreements between the stakeholders regarding SLAs, common pricing per turn, and telemetry. The pooling model later expanded to support electrification and broader common-use GSE types (at the request of the ground service providers), with LLA investing c.£700K in infrastructure changes to facilitate the introduction of electric baggage tractors[2].

Results

Safety

- More than 95% reduction in damage to GSE
- 100% reduction in aircraft damage (easyJet reported post 1st year GSE pooling implementation)
- LTN reported overall improvement of safety standards post GSE pooling

On-time performance

- More than 75% reduction in GSE-related delays
- Eliminating delays due to GSE restricting access to aircraft
- OTP (D-15) improvement by 7% (easyJet)

Congestion and optimisation

- More than 40% reduction in ramp congestion
- Standardisation of GSE fleet simplifying training requirements

Financial cost benefits

- Fixed revenue per aircraft turnaround for LTN
- Reduction of fuel costs saved LTN GHAs £90K in year 1
- Significant reduction in costs associated with engagement time of employees and GSE for GHAs

LLA's pooling model delivered measurable operational gains, with the pooled fleet reducing ramp congestion by around 40% versus the legacy ground service provider owned setup. In addition, GSE related aircraft delays fell materially by 76%, apron incidents relating to GSE damage fell by 95%, and easyJet reported a 100% reduction in aircraft damage incidents during the year-on-year comparison period October 2016 to March 2017 vs. October 2017 to March 2018. In addition, pooling saved ground service providers' c.£90K in fuel costs in its first year of operation[16].

Key take-away

The London Luton Airport case shows that pooling is most effective when it is airport-led, phased, and built around a clearly defined operational problem. The main lessons learned were that success depends on "decisive intent" and mandate from the airport authority, early stakeholder alignment, piloting to prove feasibility, phased expansion based on operational need, and strong governance through clear commercial rules, telemetry, and damage accountability. Overall, LLA demonstrates that when pooling is designed collaboratively and scaled pragmatically, it can deliver measurable improvements in congestion, safety, delay performance, and provide a stronger foundation for electrification.

Practical learning points from the LLA use case:

- **Airport mandate and early stakeholder engagement:** LLA's phased development relied on aligning the airport, handlers, and the pool provider on scope, specifications, KPIs, and the commercial model, and a clear mandate for adoption.
- **Use pilots to prove feasibility and build confidence:** the initial trial on the busiest stands provided operational evidence to support the move from concept to mandated pooling.
- **Phasing and scope expansion should be demand-led:** starting with high-volume, low-complexity assets and expanding (e.g., to EBTs, trailers, and later pushbacks) helped manage risk and reflect operational realities.
- **Commercial neutrality can reduce competitive friction:** a consistent per-turn pricing approach, independent of market share changes, can help stabilise ground handling service provider economics.
- **Embed technology and clear damage rules to support governance:** telemetry and defined damage thresholds/coverage help improve traceability, manage disputes, and protect availability through faster rectification.
- **Electrification works best when treated as a coordinated programme:** LLA's transition planning highlights that fleet renewal, charging/infrastructure changes, and interim refurbishment strategies need to be designed alongside the pooled operating model.

Hong Kong International Airport (HKIA)

Motivation

Airport Authority Hong Kong identified that ramp handling performance was being affected by GSE availability, cross-apron GSE movements, apron-road congestion, and the presence of aged diesel-powered equipment operated by ramp handling operators. Following the review of aircraft ramp-handling processes, which included an in-depth 2016 analysis of arrival baggage delivery performance, the timely provision of GSE was found to be a key service-standard driver, and a significant contributor to performance level failures when not effectively managed. They also discovered that around one-third of failures to meet prescribed performance levels were GSE-related, due to either late or insufficient GSE for handling aircraft turnarounds[2, 12, 13].

Approach taken

HKIA adopted an airport-led pooling framework (GSE Pooling Model #2) from 2018, positioning the scheme as part of a broader ramp efficiency and sustainability programme rather than simply a change in GSE ownership. The model focused on selected high-volume common-use assets, with common specifications, clearer operating rules, and centralised oversight designed to reduce duplicated fleets and improve equipment availability at the stand[12].

A key part of the approach was the emphasis on governance and enabling infrastructure. HKIA was clear on their mandate for pooling and worked to align ground handling service providers around shared use, defined responsibilities for serviceability and safe operation, routine performance oversight, and infrastructure requirements such as workshops and charging capability. This ensured the pooled fleet could be maintained and operated to a consistent standard, and that it also progressively supports the wider transition to electric GSE[4, 17].

Results

Safety

- HKIA reported significant reduction in safety related incidents involving GSE:
  - Reduction in GSE movements
  - Avoidance of poor operator driving behaviour
  - Tighter control over GSE safety specifications

On-time performance

- Significant reduction in GSE related delays (previously accounting for >30% delays)
  - Elimination of lack of GSE availability by GHA
  - Strategic GSE staging across airport, minimising GSE travel time (refueling, positioning to A/C stands)

Congestion and optimisation

- Significant reduction in ramp congestion, and KPI improvement
- Standardisation of GSE fleet, simplifying training requirements
- Significant efficiency gains of higher utilisation of GSE and workforce
- Reduced local emissions and improved working conditions

Financial cost benefits

- Fixed revenue per aircraft turnaround for HKIA
- Significant reduction in operating costs including FTE engagement time and GSE for GHAs

HKIA has reported benefits across three principal areas[13]:

- Improved operating efficiency through more coordinated and standardised common-use equipment
- Reduced apron congestion through lower levels of duplication and unnecessary cross-apron movements
- Improved environmental performance by supporting the airport's wider electrification roadmap

The scheme has also been positioned as improving safety and maintenance consistency across the shared fleet, reducing variability in equipment condition and supporting more reliable ramp handling. Internal reporting points to improvements in HKIA's critical KPI achievement rate, including reduced surplus GSE

between peak and off-peak operations, lower workforce engagement and cost, and a reduction in aircraft ground delays[2,12].

Key take-away

The Hong Kong International Airport case demonstrates that pooling can be effective even in a complex, high-intensity hub environment when it is treated as a structured airport-wide operating model. Key learnings were that success depends on standardisation, enforceable governance, confidence in availability and serviceability, and the early integration of electrification infrastructure into the operating concept.

Overall, HKIA clearly shows that pooling is not limited to smaller or predominantly narrow-body airport environments. Where the scope is clearly defined, stakeholders are aligned, and operational governance is strong then pooling can support an improved turnaround performance that is safer and more consistent as well as significantly reduces congestion, and further provides a more coordinated pathway to electric GSE deployment.

Practical learning points from the HKIA use case:

- **Position pooling as an airport mandated operating model change:** clear "decisive intent" of implementing pooling to address real operational deficiencies, and not only a procurement change—linking equipment scope, stand processes, and oversight into one programme.
- **Standardisation is a value driver:** common specifications and maintenance regimes reduce variability and support safer, more repeatable turnarounds.
- **Governance must be operationally enforceable:** availability targets, defect response expectations, and clear escalation routes are essential to handler confidence.
- **Electrification requires coordinated infrastructure:** chargers, power planning, and maintenance capability need to be designed alongside the pooled fleet, not as an afterthought.
- **Phasing builds trust:** starting with appropriate asset classes and expanding scope based on measured performance helps secure stakeholder buy-in.

Perceived strengths and weaknesses

The perceived strengths and weaknesses of GSE pooling vary by stakeholder, however there are some common denominators. Pooling can reduce redundant assets, improve stand readiness, strengthen safety and operational consistency, and provide a more coordinated pathway to electrification, while also introducing concerns around control, accountability, commercial neutrality, and implementation risk[3].

Ground handling service providers may benefit from lower capital intensity and reduced fleet management burden[18], but can be sensitive to loss of differentiation and direct control[2].

Airports see pooling as a tool to reduce congestion, improve standards, and support sustainability objectives, though they carry greater governance and reputational exposure[3,15,12].

Leasing providers gain scale, long-term demand, and broader service opportunities but assume higher operational and performance risk[2,11].

Airlines may benefit from improved on-time performance, fewer ground damage incidents, and more consistent handling execution, provided the model does not create ambiguity over accountability or a single point of operational failure[2]. Newer pooled GSE may also be seen as increasing per-turnaround costs compared with older, largely depreciated equipment.

The key perceived strengths and weaknesses by stakeholder can be summarised as follows:

Stakeholder	Perceived strengths	Perceived weaknesses
Ground service providers	• Lower redundancy, prepositioned GSE on stand • Removal of CAPEX intensity and fleet management • Electrification facilitation	• Loss of direct control of GSE standards • Differentiation of product offering • Lowers the bar to market entry (competition)
Airport authorities	• Reduces apron congestion and future proofs capacity • Safety and operational integrity enhancements • Facilitation of GSE electrification	• Governance and stakeholder complexity • Potential anti-competitive perception • Reputational exposure (ineffective model)
GSE leasing providers	• Scaled and secure long-term demand at airport • Improved asset utilisation (economics per unit) • Additional services (charging as a service)	• Increased operational and performance risk • Multi-user management (disputes, availability) • Infrastructure exposure (airport works dependency)
Airlines	• Improved on-time performance (OTP) • Reduced ground damage risk • Supports sustainability agenda	• Single point of failure risk • Accountability ambiguity • Perceived cost uplift versus depreciated legacy GSE

Ground handling service providers (GHSPs)

For ground service providers, GSE pooling is viewed from financial, operational, and commercial perspectives. Given that GSE is the second highest expenditure in a ground handling business, pooling can remove a major source of capital intensity. In highly competitive handling markets with short or uncertain contract durations, GHSPs may welcome a move from CAPEX heavy ownership to a more variable, usage-linked cost base (i.e., a fee per turnaround), or a monthly usage-based fee structure that is determined by the total cost of pooling at the airport divided across the GHSPs by annual expected volume. Although unlike a full-service lease (FSL) model, pooling also removes the fleet management burden.

Pooling can also reduce redundancy (surplus GSE), enhance equipment availability and positioning, reducing time spent locating and moving assets, which also provides protection against airline SLAs (e.g., prepositioned steps improve door 1 & 2 opening time SLAs). Further benefits are realised through asset standardisation which improves safety and training consistency, and pooling also provides an effective pathway for GSE electrification ambitions, particularly if there are manufacturer (OEM) supply bottlenecks (due to demand), and where electrical infrastructure limitations exist across airports.

However, the pooling model can also create concerns around equipment availability and condition with this being perceived to be outside of the operator's direct control. Ground service providers also tend to see GSE as one of the main levers to protect service quality, manage disruption, and differentiate their proposition to airlines based on their own standards.

Negative perceptions may also be created around the potential "lowering of the bar" in terms of market entry for competition, and a lack of clarity due to no immediate involvement in co-creating the commercial terms from the outset could question their level of comfort in balance of power within the stakeholder dynamic, particularly if there is an additional financial advantage for one party (over and above the base pooling lease revenue) or revenue stream.

Airport authorities

Airport authorities typically consider GSE pooling as an airside optimisation tool primarily as a means to address core operational constraints that will primarily reduce congestion, improve stand discipline, improve safety and equipment standards, ensure consistent operational integrity, and ultimately future proof the capacity of the airport operation over time.

By centralising GSE provision, pooling reduces unnecessary equipment movements and enhances the consistency of turnaround operations. It also enables airports to coordinate fleet renewal and charging infrastructure more effectively against overall (ATM) demand. Importantly for airports, GSE pooling is considered a significant enabler to increase capacity where there are existing constraints and pave the way for additional ground handling service provider entrants, whilst minimising the need to expand infrastructure as the airport grows[2].

The case studies referenced in this paper illustrate that airports often initiate pooling following recurring pain points, which as mentioned above are usually related to constrained apron space, equipment congestions on the apron, safety incidents, and delay drivers linked to GSE availability or movement.

Pooling also provides airports with a mechanism to accelerate sustainability objectives by coordinating fleet renewal and charging infrastructure, making it a key enabler of large-scale electrification

in environments with multiple ground handlers, which can be more complex where multiple handlers operate.

However, these benefits come with increased complexity and risk at the airport level. Pooling requires sustained coordination across multiple stakeholders, and misalignment can create operational friction or inefficiencies. Potential delays may also be created in certain fundamental steps, such as the procurement decision, and facilitating the alignment of ground service providers' different preferences on GSE specifictaions[13]. Mandated participation may also be perceived as market intervention, raising concerns around competitiveness and fairness. Importantly, airports often carry reputational exposure if the pooling model underperforms, even when delivery is outsourced, particularly in cases of equipment shortages or poor maintenance response. In addition, the implementation of pooling, especially with electrification, demands significant investment in infrastructure, operational oversight, and governance frameworks, which can increase both cost and execution risk in the short term.

GSE leasing providers

For GSE leasing providers, pooling represents a shift from bilateral leasing relationships (handler-by-handler) to a broader, airport-wide service proposition, typically under a single framework with performance commitments and multi-user interfaces. The commercial logic is attractive where the provider can become the sole (or primary) GSE fleet partner for an airport, supported by long-term agreements (PFAs), operational "stickiness," and revenues linked to turns and traffic growth.

Essentially, the PFA and long-term engagement at the airport creates an opportunity for leasing providers to become a critical operating partner rather than just a mere asset supplier (for both airports and all incumbent ground handling service providers). What securing a pooling agreement also means for a leasing provider is that it locks in dependability over time, which increases switching costs for airports and ground handling service providers, particularly where pooling also supports electrification, maintenance, telemetry, and infrastructure services.

Long-term pooling arrangements also give a leasing provider more predictable demand, better asset utilisation, stronger customer stickiness, and the ability to offer broader value-added services around compliance and electrification.

At the same time, pooling increases the provider's operational accountability since the lessor is no longer simply supplying assets, but is expected to manage the availability, maintenance performance, compliance, and now even more so electrification infrastructure planning.

The main weaknesses are the higher operational accountability, complexity of managing multiple users fairly, exposure to forecasting and performance risk, and the capital burden associated with workshops and wider pooled infrastructure, particularly for electric GSE.

Airlines

Airlines typically experience GSE pooling indirectly through its operational performance in terms of turnaround reliability, safety performance, and service consistency. While airlines may have limited appetite to become involved in the detailed commercial arrangements between airports, handlers, and pool providers, they have a clear interest in any model that reduces disruption risk and ground damage events, and that supports predictable OTP. In practice, airlines tend to support pooling when it demonstrably improves stand readiness (equipment in place when the aircraft arrives), reduces

congestion around the aircraft, and standardises equipment condition and safety features—without introducing variability across turns or terminals.

From an airline contracting perspective, pooling can be attractive where it helps ground handlers offer more stable pricing (where equal to or less than the cost of the decentralised model) and removes the need for each ground handling service provider to recover separate fleet costs through handling rates, particularly at airports with multiple GHSPs and constrained apron space.

However, airlines may be cautious if a pooling model increases their operating costs, where the cost of pooling might be perceived to be higher. This perception of cost increase is particularly pronounced where the incumbent and aged GSE costs are lower due to the asset value already been written down, affording the ground service provider to offer a more competitive turn rate, compared to the lease cost of the new pooled GSE. Airlines are also concerned whether pooling creates a single point of failure, or if service levels are not clearly assured in a way that translates into contractual accountability (i.e., who is responsible when equipment availability drives delay or service failure). Airlines therefore typically prioritise transparent performance management, clear escalation routes, and evidence that pooling reduces, and not increases, operational variability at the stand. Ultimately, airlines' main interest is more to do with delivering the safest and best possible OTP, and more consistent handling execution in the most cost effective way.

GSE pooling outlook

Compelling conditions

The future viability of GSE pooling will depend less on whether the model is conceptually attractive, and more on whether airports and their partners can remove the practical barriers that have historically limited adoption.

This paper's use case examples demonstrate that pooling is most compelling where airports face constraints in stand capacity, apron congestion, turnaround performance, and where stakeholders can align around a common objective in working together and sharing GSE, rather than treating it as a competitive differentiator.

Under these conditions, pooling can unlock measurable improvements in equipment utilisation, discipline, reliability and enhance overall operational integrity. Furthermore, a clearer pathway to electrification also surfaces as an attribute, which in turn may be an accelerant for pooling given the potential future demand and barriers for installing electrical GSE at airports under a decentralised model[2, 3, 12].

Barriers

Our observations from across industry implementations and stakeholder feedback is that the most consistent barriers fall into four key themes:

- **Control and competitive identity:** GHSPs are concerned that common-use equipment may erode differentiation, reduce operational autonomy, and introduce dependencies outside their direct management.
- **Availability and serviceability:** because operational demand is variable, GHSPs need confidence that pooled fleets can absorb delay propagation, irregular operations, maintenance requirements, and peak overlap without creating shortages that drive OTP penalties.

- **Accountability for condition and damage:** a shared asset base can create uncertainty over who caused damage, who pays, and how quickly defects are repaired (unless the model is designed with traceability systems, clear accountability and rapid escalation processes).
- **Commercial neutrality and market access:** stakeholders need to trust that pricing, service levels, and access rules are transparent and non-discriminatory, particularly where the airport mandates participation as part of the operating license.

Addressing these barriers begins with the early engagement of all stakeholders, the facilitation of ensuring that each party clearly understands their position, and what the pooling model means to their business (particularly GHSPs). The case studies above have demonstrated that collaboration significantly increased over time to reach an optimal point of operations by working together, however a stronger emphasis on building trust and forming a "coalition of the willing" from the outset would be a significant enabler for any successful pooling model.

Practical terms

Successful pooling arrangements tend to converge on a repeatable set of tripartite conditions, based on disciplined governance and contract design, that protect each stakeholder's core interests, particularly considering the following key aspects[2, 12, 14]:

- **A defined scope and phasing:** start with high-volume, general-purpose assets (and/or stand-allocated sets) before expanding to more complex motorised equipment.
- **Right-sizing and resilience:** transparent demand modelling and stress-testing for peak overlap and disruption, with agreed contingency rules.
- **Service levels that reflect operational reality:** availability and response-time KPIs by asset family, with clear escalation, penalties/credits, and governance.
- **Safety, standardisation, and training simplicity:** common specifications, consistent safety features, and alignment with industry best practice.
- **Accountability and damage regime:** traceable user attribution, defined wear-and-tear vs. damage rules.

As previously mentioned, the pooling operator needs a clear mandate, with roles and responsibilities defined through a structured set of agreements (i.e., GSE Pooling Stakeholder Agreement) between the airport and GSE provider (e.g., Pooling Model #1), and pool user agreements with each ground handling service provider).

These agreements should be aligned with industry best practice, and translate operational needs into measurable service commitments (availability targets by asset family, response times for defects, preventive maintenance windows, and defined escalation routes) supported by a joint performance committee that includes the airport and all pool users, which govern the operationally enforceable participation rules and stand discipline.

Enablers

Technology is increasingly being considered as the enabling layer that turns pooling from a "sharing concept" into a reliable operating system:

- **Telematics, geofencing, and user authentication:** can provide real-time visibility of asset location, utilisation, and health status, while restricting operation to authorised users and improving attribution when incidents occur.
- **AI, flight information, and resource management systems (RMS) integration:** at more advanced levels, potential integration with disparate systems can support dynamic allocation and staging, helping to ensure that critical GSE is in position, in the right place at the right time. AI turnaround tools also potentially learn quicker with common use equipment being the same taxonomy and types.
- **Electrification as a coordinated programme:** joint planning of chargers, power capacity, maintenance workshops, and fleet renewal timelines so that eGSE deployment is not constrained by fragmented investment decisions.
- **Robust change management and trust-building facilitation:** effective facilitation of early engagement and involvement from all parties (including front line teams); a trial or pilot; transparent reporting; and a continuous improvement mechanism owned jointly by airport, handlers, and the GSE lessor.

Collectively, these conditions appear to convert pooling from a structural concept into an operationally grounded proposition that protects operational integrity, clarifies accountability, and supports measurable safety and sustainability outcomes.

Measures of success

As global air traffic growth increases and airports face tightening constraints (on capacity, cost, safety, and sustainability) the way GSE is owned, deployed, and governed is becoming a decisive lever of airside performance. We observed that, in some cases, legacy decentralised GSE fleet ownership unintentionally drives unnecessary redundancy, apron congestion, inconsistent standards, underutilisation, and the propagation of an ageing fleet.

In contrast, the primary benefits of a well-designed pooling model in an airside operation are realised in the significant reduction of duplicated assets, apron congestion and unnecessary equipment movements, resulting in further improvements in safety, turnaround reliability, asset utilisation, and lifecycle management.

However, it's also our view that there is no single pooling model that serves as a universal remedy (or a "cookie cutter approach"), and that any pooling option must be assessed against local operating dynamics and stakeholder benefits.

The main drivers for pooling appear to be safety, operational integrity, efficiency, and sustainability. Therefore, airports consider pooling as a route to improved stand discipline, safety oversight, and coordinated electrification, which ground handling service providers will also benefit from in realising their own electrification ambitions. However, while valuing reduced capital intensity, sensitivity to loss of control, disruption resilience, and differentiation still remains.

GSE leasing providers can enable scale and lifecycle optimisation within their own business plan and could realise a significant proportion of their fleet being allocated to pooling within the next 10 years. Although in doing so they also take on greater operational accountability as a performance-critical partner and could face pressures of competition where market share becomes disproportionate in favour of one provider.

Airlines' operational concerns (OTP, safety, and service consistency) could in part be addressed by way of pooling, as this effectively becomes perceived as a service driven output rather than based on a ground service provider who merely has GSE capability. Although the perceived risk for airlines here is not only a potential single point of failure but also cost sensitivity. Therefore, transparency from the outset is of paramount importance particularly in terms of any change in cost, due to the dynamics of replacing the legacy model (which may consist of older GSE) with a pooling model (typically new or younger GSE), which need to be justified, and the switching cost against the benefits over time clearly demonstrated.

As such, the model does mean different things to each of the stakeholders. Although concerns and risks may not be insurmountable, they do need to be properly addressed from the outset. The perceived risk for ground handling service providers losing direct control of their assets needs to be mitigated and balanced with the broader benefits, which is particularly important when the other stakeholders may be perceived as having a lower proportion of risk by comparison.

Where pooling is successfully adopted, we note the strongest measures of success appear to be concentrated around the following five key factors:

1. **Early stakeholder alignment and trust-building are critical:** successful pooling depends on engaging airports, GHSPs, pool providers, and front-line teams early, so that the scope, commercial model, operating rules, KPIs, and practical constraints are jointly understood before adoption is mandated.

2. **Pooling must be designed as an operating model change:** the successful models observed link equipment scope, stand processes, availability standards, maintenance regimes, and oversight into one coordinated programme, with shared responsibility across all stakeholders.
3. **Pilots, phasing, and demand-led scope expansion reduce implementation risk:** trials on selected stands or asset classes help prove feasibility and build confidence, while phased expansion from high-volume, low-complexity equipment to more complex assets allows the model to reflect operational realities and measured performance.
4. **Commercial neutrality and enforceable governance protect stakeholder confidence:** transparent pricing and agreed charging methodology, clear access rules, availability targets, defect response expectations, escalation routes, telemetry-enabled traceability, and defined damage regimes help reduce competitive friction, manage disputes, and protect service reliability.
5. **Electrification and digital enablement should be planned as part of the pooled model:** fleet renewal, charging infrastructure, power capacity, maintenance capability, telemetry, and asset visibility need to be coordinated and clarified from the outset so that pooling supports both operational resilience and longer-term sustainability objectives.

It's important to note the common factor between Luton and Hong Kong airports is that pooling was not introduced as a parallel initiative. Rather, it is an integral part of the ground handling concession design. A definitive mandate surfaces as the catalyst, which is underpinned by the above themes as the enablers to realising a fit for purpose and successful pooling operational model.

In terms of feasibility, code C airports (predominantly narrow body aircraft operations such as London Luton Airport) are perceived to lend themselves to pooling more given the reduced level of difficulty compared to larger airports and wide body operations, however the respective sensitivities of the stakeholders and local nuances still exist. Bristol Airport (UK) is another example of a code C airport that is serious about employing the broader pooling model as a solution to address increasing operational concerns (i.e., capacity, congestion and safety on the ramp). The intention is to follow suit with the London Luton Airport example in terms of a phased process in introducing different GSE types over time aligned with Pooling Model #1. The successful implementation of pooling at Tier-1 airports is clearly not insurmountable either given Hong Kong International Airport's demonstrated robust improved performance. JFK New Terminal One (NTO) will be the world's first completely electric and 100% pooled GSE operations. Beginning the process in 2024 (with the issuing of a tender for an all-electric GSE fleet to be provided, managed, and maintained ahead of the terminal's 2026 opening), TCR were subsequently selected as the GSE pooling provider in January 2025. However, the reported implementation challenges include executional aspects, such as integrating pooled eGSE with infrastructure at each gate, as well as commercial and operational issues in terms of aligning the pooled model across the community, specifically ground handling service providers.

As mentioned above, pooling can serve as an enabling platform for what could be the next stage of evolution for ground operations, between coordinated investment in charging and eGSE fleet renewal, harmonised data and performance visibility, to drive a more integrated turnaround management.

Furthermore, common specifications, minimum GSE age and condition standards management, and telemetry coupled with sophisticated IT systems and data facilitates a centralised and predictive maintenance function, which altogether enhances visibility, accountability, and lifecycle performance across the fleet. At the same time, pooling can accelerate eGSE deployment by aligning fleet renewal, charging infrastructure, power capacity, and maintenance capability. In that context, pooling works towards more of a performance framework that, when governed well, can help the entire airport community deliver safer, cleaner, and more reliable turnarounds at scale.

In summary, there appears to be growing consensus across the airport stakeholder community that a 'fit-for-purpose' GSE pooling model can be cost-effective and deliver significant operational benefits. However, successful implementation depends on a clear airport-led mandate, supported by the right conditions for all stakeholders. Robust facilitation and early engagement, particularly with front-line teams, is critical to building trust and creating a practical model that works. When pooling is tailored to the specific needs of each operation, stakeholder, and end user, then it is more likely to create a "coallition of the willing" who work together to deliver sustained benefits across the entire airport community.

Reference footnotes

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