Sustainability in Aviation: Aircraft Investors' Perception

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Abstract

Aircraft investors are a unique group of stakeholders with a critical role in financing the aviation industry. Investors supply capital for aircraft through the financing and leasing of aircraft. Despite their role in owning and/or managing more than half the world's commercial fleet, to date they have not been public-facing when discussing sustainability in aviation.

Regardless of their latent role, aircraft investors take an active interest in global the efforts to decarbonise aviation. Understanding their perspectives would help us to comprehend how they can contribute to these global efforts. Uncovering patterns in their collective thinking can guide the development of sustainability projects and influence the financing of aircraft.

Their perspective is investigated using the Q-methodology and a survey of 13 statements extracted from a broader discourse of sustainability as discussed amongst lessors, financiers, bankers and servicers of aircraft. The analysis identifies underlying opinions common to most participants, as well as disagreements and particular beliefs.

1. Introduction

Sustainability in aviation is on the agenda for all industry players, from passengers to airlines, engine and airframe original equipment manufacturers (OEMs), jet fuel suppliers, government agencies, and investors. Various stakeholders are committed to helping aviation to achieve sustainability targets such as carbon neutrality by 2050 (IATA, 2021). At present, aircraft investors are not seen as playing a prominent role in this, despite being an integral part of the industry by owning, managing and financing more than half the commercial fleet of aircraft.

Investors are less studied among sustainability stakeholders (Ruiz et al., 2020). In this study, investors are defined as aircraft investors, which are a diverse group of lessors, asset managers, capital providers, banks, and insurers. Also, the terms "aircraft financing" and "aircraft investing" are used interchangeably, although the author notes that the nuance of "financing" is often used to describe the debt side, while "investing" is mostly used in the sense of equity.

Understanding the views of investors could contribute to the betterment of the industry. It could reveal topics that lead to consensus among industry participants, as well as revealing diverging/polarising opinions and issues that provoke conflicting reactions. Mapping their thinking could also highlight how these industry participants might guide or be guided to help sustainability efforts and decision-making.

2. Data collection

The sample consists of a nonarbitrary participants list. The 50 participants are employees of aircraft leasing companies, banks, financial institutions and servicers of aircraft based in Europe, the US and Japan. The participants are directly known to the author or were introduced through close industry contacts. A few of the participants volunteered through snowball sampling by other survey respondents. The participants are all members of senior management across a broad range of professional backgrounds from aircraft marketing, aeronautical engineering, risk management, aviation lending, and the legal profession. Their titles extend from VP to CEO and board of directors – all having the power of decision-making or being in a position to influence decision-making in their companies. The respondents are expected to represent a plurality of opinions due to the diversity of their roles and their nuanced involvement in aspects of sustainability in aviation. In total, 63 people were approached and invited to participate in this study and 50 agreed to participate. The participation rate was 79%, which is a

good measure of their willingness to share their opinions. The sample size is optimal for maintaining the data quality and sufficiently large for statistical arguments.

2.1 Q-methodology and data collection

The Q-methodology is a well-known technique for surveying elite cohorts. It was developed in the context of psychology by Stephenson (1935) and has since expanded to other disciplines. To the author's knowledge, this is the first application to aircraft financing.

This research method allows one to analyse opinions and identify shared thinking. From a heterogeneous set of opinions, it can extract the blend of ideas most advocated by participants. This method is exploratory; it does not prove any hypothesis but brings coherence to a complex research question (Watts and Stenner, 2005).

The method starts with a set of statements about a specific subject, in this case, sustainability in aviation within the specific group of aircraft investors. The original set of statements is a blend of ideas circulated in the scholarly literature, opinions expressed in conversations with industry participants, and public views expressed on panels at aircraft financing conferences. The list of 13 statements, included in section 2.3, has been put together with the view to represent as much of the opinion domain as possible, and has been distributed to the participants with instructions to rank them relative to one another, guided by the grid structure in Figure 1.

Figure 1: Q-grid, symmetric and centred at 0.

-3	-2	-1	0	+1	+2	+3

The structure resembles an inverted triangle, similar to a normal distribution, with more statements in the centre of the distribution than under the tails. This particular shape forces respondents to mindfully select only a few statements that reflect strong agreement or disagreement. Moreover, ranking each statement relative to the others forces participants to disclose their core thinking. Typical surveys take a fragmented approach by rating each statement on its own, but the Q-methodology takes a holistic approach that brings everything together at the same time.

After receiving the Q-set, each participant ranks each statement according to the quasi-normal distribution in Figure 1. Values of +1, +2 and +3 for agreement, -1, -2, -3 for disagreement, and 0 for relative neutrality. The higher the modulus of the label, the stronger the agreement/disagreement relative to the other statements. The 0 is not exactly neutral but one rank below +1 and one rank above -1.

The collection of statements – referred to as the Q-set – broadly reflects the general conversation about sustainability as discussed among aircraft investors. The concourse covers themes related to the perception of urgency of climate action (1, 8); an understanding of one's own role and responsibility (2, 3); regulations and reporting (4, 5); pressure – both received and passed on by investors (6, 7); the relevance of ESG (Environmental, Social, and Governance) (8); shared cost/returns (9, 10); and quality and availability of information (7, 11, 12, 13). This list is representative, although not exhaustive, of themes prevalent among investors and financiers regarding sustainability in aviation. Moreover, these are mild statements: the author avoided radical opinions that would lead to participants to quickly agree or disagreed (Watts and Stenner, 2012, p61).

To reiterate, the 50 participants were asked to rank the 13 statements into the grid structure presented in Figure 1. The contribution of each participant is an array composed of the 13 values: -3,-2,-2,-1,-1,0,0,0,+1,+,1,+2,+2,+3, referred to as the Q-sort. The data from all 50 participants, that is, 50 Q-sorts, are included in Appendix A. The participants are anonymised, although their identity is known to the author.

2.2 Survey Discourse

Until the mid-2010s, very few investors took notice of ESG developments, but there is an enhanced awareness that "societal megatrends, such as inclusion and climate change" will play a role in the resiliency of companies (Serafeim, 2020). Studies found that ESG is "almost universally top of mind" for executives, despite perceptions that "ESG just hasn't gone mainstream in the investment community" (Eccles and Klimenko, 2019).

While OEMs and airlines have always been under self-imposed pressure to act on the impact they have on the climate, by improving fuel burn to reduce cost and therefore reduce emissions, aircraft investors have taken a more low-key role. Their contribution to sustainability has consisted in supporting new aircraft technology by direct orders with OEMs, or helping airlines to finance new orders. Lessors are often the launch customers for new aircraft types, and their endorsement of new aircraft technology has helped to define the success of certain types on the market. However, recent developments in sustainability and policy frameworks have increased the pressure on investors to participate beyond investing in new aircraft technology. This pressure is often perceived as recent and somewhat surprising. Some industry participants would argue that the need for climate action has been known for a long time, but the industry is still still slow in addressing it.

The increased awareness of the effects of climate change has led to intensified **environmental activism**. There is a "significantly increased saliency of climate preferences in the society of large", especially among young people (Ramelli et al., 2021). Studies suggest that "corporate leaders will soon be **held accountable** by shareholders for ESG performance—if they aren't already" (Eccles and Klimenko, 2019). Moreover, there is empirical evidence of a "significant loss in market valuation for carbon-intensive firms" as a **consequence of activism** and considerable public attention focused on environmental activism (Ramelli et al., 2021). Despite being involved with half the global commercial fleet, aircraft investors are not yet public-facing, but may still risk the same **external pressure** to address sustainability issues. All businesses will experience "**growing pressure** to improve their performance on ESG dimensions in the future" (Serafeim, 2020).

Not only can investors feel external pressure, but they can also exert pressure on other stakeholders. It has been shown that investor pressure can positively affect the **quality of sustainability information** disclosed by "demanding more and better sustainability information" (Ruiz et al., 2020). It is not clear if aircraft investors are in a position to **exert pressure** on other players to obtain the information they need, but if they do, they could likely improve, for example, the quality of sustainability reporting.

Unlike financial reporting, sustainability reporting lacks robust standards, which leads to the excuse of **inaction** (Soonieus, 2022). Though rating agencies, airlines and investors have developed various sustainability KPIs, such instruments often display discrepancies in how they are calculated or defined. The lack of agreement over the subdimensions covered, and how they are accounted for (Antolín-López et al., 2016), could cause some investors to **postpone** developing any green deals until the industry adopts standardised approaches.

For aircraft investors, much environmental information comes from the annual or environmental reports of airlines. However, a systematic review of how airlines communicate sustainability to stakeholders indicates that "the industry has **lacked a unified policy** and common understanding of how to define and measure sustainability" (Zieba and Johansson, 2022). Investors have expressed concerns about the complexity and lack of comparability between reported metrics, which causes ambiguity and confusion in interpretation. Moreover, it has been noted that environmental data about airlines can also be "**insufficiently informative** and transparent" and "practically incomparable for making investment decisions" (Stevenson and Marintseva, 2019).

Similarly, numerous policy frameworks have emerged to guide the industry. For example, the EU ReFuel initiative, which provides clear mandates in Europe, is perceived as incomplete. Its mandates are insufficient for delivering "the necessary capital investment to spur widescale commercial deployment of SAF" and in need of additional measures like public funds allocation to reduce the price gap between SAF and conventional jet fuel (Montero-Pascual et al., 2022). A common attitude among aircraft investors is **waiting** for more robust policies and consistent sustainability metrics to guide their decisions.

No single corporation can address such a complex challenge as environmental sustainability. Many business leaders admit that tackling such a challenge requires **unprecedented cooperation** among stakeholders (Payán-Sánchez, 2018). Sustainability needs collaboration and integration across scientific fields — but also a collaboration with civil society, governments and other stakeholders (Mauser et al., 2013). In their role of providing capital for aircraft through aircraft financing and leasing, investors comprise a powerful group of stakeholders in aviation. Some investors can **exert more influence** than others (Ruiz et al., 2020) and even lead the move towards sustainability. Their role in **leading sustainability** is not yet fully defined, but the need for a collaborative framework is evident for all stakeholders. A sense of **shared purpose** may outweigh competing interests.

Aircraft investors have increasingly begun to discuss societal issues and express their desire to participate in sustainability, philanthropy, charity, diversity and inclusion, and gender equality. The focus remains on profits

and industry-specific challenges, but the intersection between societal concerns and business performance is starting to move from a **tangential position** to a more meaningful overlap. The COVID-19 crisis is likely to have increased "awareness that companies must consider societal needs, not just short-term profits" (Serafeim, 2020). This may be even more true for the aviation industry, which was disproportionately impacted during the COVID-19 crisis.

Increased demand for sustainable investment strategies saw asset owners stating that they wanted to contribute to **making a difference** in the world (Eccles and Klimenko, 2019). Some believe such a mission needs **to relinquish part of the profits**. There is promising evidence that companies with a good environmental performance have better access to finance in the capital markets: they have lower capital constraints and may enjoy a lower cost of equity (Cheng et al., 2011). Aircraft investors have also expressed their desire to make aviation greener, although they may not yet be ready to carry any cost.

Additionally, several participants expressed a sense of being overwhelmed by the complexity of tackling sustainability from the perspective of aircraft investors. A global survey conducted across 43 countries by the INSEAD Corporate Governance Centre and Heidrick & Struggles (INSEAD, Heidrick & Struggles, 2021) investigated how boards of directors handle decarbonisation and how they integrate climate change into their responsibilities. The survey found that 85% of board directors said their board "needs to increase its climate knowledge". The same **need for knowledge** has been expressed among aircraft lessors and financiers – although acknowledging that some have more advanced expertise than others. Sustainability is still a **novel issue** for some participants, who may feel that they are inadequately prepared or have insufficient knowledge to make impactful decisions. The survey conducted by INSEAD, Heidrick & Struggles (2021) concludes that "directors are **overwhelmed** by the scale and complexity" of their ESG responsibilities and that "they don't know where to start" (Soonieus, 2022).

This general discourse has been condensed into a sequence of 13 statements. The summary listed below is only one of the many ways in which to summarise the broader conversation – although the author believes this is an adequate version.

2.3 Survey Statements

1. "*Aviation stakeholders are caught off guard by the urgency of climate action and the need for sustainability in the aviation industry.*"

2. "*As investors, we have an essential role to play in stewarding the aviation industry towards sustainability.*"

3. "*Investors want to know they are making a difference to the world and are ready to bear the cost of making aviation greener.*"

4. "*Before committing to any green deals, investors should wait for a more robust policy framework and standardised reporting KPIs.*"

5. "*Airline reporting on environmental issues is weak in airlines' annual reports. Not enough information is disclosed*."

6. "*Environmental activism has intensified, and aviation investors fear they will be made accountable if they do not address the sustainability issue in aviation*."

7. "*Investors can easily obtain the information they need on sustainability performance without exerting pressure on other stakeholders (e.g. airlines, lessors).*"

8. "*ESG in aviation is not a critical business issue yet.*"

9. "*Environmental sustainability in air transport can be achieved, and everyone should carry the cost: OEMs, passengers, airlines and investors.*"

10. "*Aircraft investors are changing their focus from short-term financial results to long-term value creation.*"

11. "*Sustainability is a novel field for aircraft investors, and we are not yet equipped with the necessary expertise to make meaningful and impactful changes.*"

12. "*There is a plethora of information on environmental topics, and it is time-consuming to select the most relevant data/publications.*"

13. "*Sustainability requires more promotion to communicate its impact on investment decisions.*"

2.4 Data Analysis

The analysis is performed in *R* (R Core Team, 2022) using the *qmethod* package by Zabala (2014). For the purpose of analysis in R, data are organised as the transpose of the table in Appendix A, with 13 statements as rows and 50 participants as columns. The *qmethod* function processes the data.

Q-sorts are typically intercorrelated, and a small number of factors are extracted based on their correlations. The **factors** are clusters of "commonly shared attitudes or perspectives" (Brown, 1980, p6). The factors are extracted via Principal Component Analysis – the default factor extraction in the *qmethod* function. The factors can be considered separate views about sustainability in aviation finance. These views are not the same as one person's opinion – although they could be someone's opinion, but instead define a theorised collective perspective.

Further manipulation of the extracted factors is guided by the need to deliver the most informative viewpoints of these factors. Rotation techniques are used to reposition factors to align them with Q-sorts and thus provide "more focused and informative positions relative to the Q sorts" (Watts and Stenner, p121). The factors are rotated using the varimax technique – an orthogonal rotation that preserves the perpendicularity between factor axes during rotation and maximises the amount of explained variance. The resulting factors are statistically independent and have zero correlation. The rotation results are a matrix of factor loadings for each Q-sort; a weighted average of the Q-sorts that load significantly on a factor contribute to defining factor estimates. Factor estimates are further standardised and converted to z-scores. To make final results easier to interpret, z-scores are further translated into factor arrays that use the structure introduced in the data collection as a sequence of the 13 values (-3,-2,-2,-1,-1,0,0,0,+1,+,1,+2,+2,+3) which defined the original data. The factor arrays are presented and interpreted in section 3.

The algorithm requires prior knowledge of the number of factors. Due to their diverse attitudes, it is not apparent how many major underlying themes about sustainability exist in the thought process of aircraft investors. Hence, we do not know how many factors there should be, or which statements would define them. We allow a combination of statistics and pre-set conditions to determine the optimal number of factors. Ideally, our results should be derived using most of the data, with enough factors to explain most variance and a reasonably high number of participants contributing to each factor.

One criterion looks at the total number of loading Q-sorts. Some of the Q-sorts may load highly on more than one factor or may not be significantly associated with any factor; once identified, these participants are not included in the analysis and thus do not contribute to the results. We aim to optimise the number of loading Q-sorts and thus reduce the number of unused data entries. In our case, for two factors, the number of loading Q-sorts is 36, improving to 39 for four factors (Appendix B). There is no further improvement in the number of loading Q-sorts for five or more factors, which is why Appendix B contains results for as few as five factors. This criterion suggests that four factors maximise the use of data.

Another criterion considers the minimum number of loading Q-sorts per each factor. We impose a moderate condition of accepting only factors with at least five loading Q-sorts. This condition is equivalent to a factor being defined by at least 10% of the survey participants. This guideline aligns with Brown's (1980, p67) recommendation for a minimum of five or six people defining each factor – enough to produce reliable factors.

Another essential feature of the final set of factors is to "account for as much of the variability in the original correlation matrix as possible" (Brown, 1980, p209). As summarised in Appendix B, two factors account for 44.76%, three for 56.05%, four for 64.6%, and five for 71.52% of the variability. Five factors would bring the explained variance up to 71.52%, but one of the five factors has only three loading Q-sorts. As we aspire to build factors defined by a large number of participants, and not a minority, we reject the five-factor solution in favour of the four-factor solution.

Consequently, four factors maximise the explained variance (64.5%), with a maximum number of loading factors (39) and a minimum of five loading Q-sorts on each factor. A smaller number of factors, such as four, also reduces the complexity of interpreting results.

3. Results

The simulation study indicates that there are four factors. Each factor reveals one underlying perspective. This analysis reduces the data from the original 50 unique perspectives, one for each participant, to four factors. Each of the four factors is a crucial way of thinking.

The final step in the analysis is to produce a table of factor arrays that follow the same distribution as the original Q-sort data. Table 1 includes the resulting factor arrays, which provide the foundation for factor interpretation. This table reveals the statements given the highest ranking (+3, +2) and the lowest ranking (-3, -2) in each factor array. It also helps to visualise the ranking of statements in terms of the factor arrays. We employ the crib sheet approach proposed by Watts and Stenner (2012), in which a systemic interpretation is applied by inspecting each component in a factor array.

Statement	Factor 1	Factor 2	Factor 3	Factor 4
1	+1	+1	+1	0
2	2	0	+1	+1
3	+1	-1	-3	-3
4	-3	+1	+2	-2
5	+2	0	0	0
6	0	+3	-2	-1
7	-2	-3	-1	-1
8	-2	-2	+3	-2
9	3	-1	+2	+2
10	-1	-2	-2	0
11	-1	+2	-1	+2
12	0	+2	0	+1
13	0	0	0	+3

Table 1: Factor arrays are estimates of each factor's viewpoint.

3.1 Extracted Factors

Each factor is represented as a hypothetical Q-sort generated from the data and derived by identifying patterns of strong correlations between Q-sorts (participants). Factor 1 is the first "shared pattern" to be extracted and typically explains a larger variance component than the other factors. The first extracted factor captures most of the common ground between participants; the second factor captures some of the remaining shared behaviours, and so on. In our study, Factor 1 explains 21.86% of the variance and the remaining factors explain 17.79% (Factor 2), 13.57% (Factor 3) and 11.38% (Factor 4).

Responsible and informed (Factor 1)

Factor 1 explains 22% of the study variance. Fifteen participants are significantly loaded on Factor 1, that is, 30% of the participants in the sample contribute to defining this factor. Statements that ranked highly for this factor are 9 (+3), 2 (+2) and 5 (+2). The lowest ranking was obtained for statements 4 (-3), 7 (-2) and 8 (-2). Moreover, several statements ranked more highly for Factor 1 than for any other factor (2, 3, 5 and 9) and some ranked lower for Factor 1 than for the other factors (4, 8, 11, 12, 13).

Factor 1 conveys a sense of responsibility. The viewpoint of Factor 1 is that investors are willing to bring change to the current situation and contribute to making aviation greener. Not only do they believe that everyone in the ecosystem (9:+3) has a role to play in sustainability (OEMs, passengers, airlines, and investors), but the particular role of investors is a critical one (2:+2).

The participants in this group are informed or try to stay informed on issues related to sustainability. For these investors, sustainability is not a novel concept (11:-1); and they are aware that there is enough information on environmental topics (12:0) and that the impact of sustainability on investment decisions does not require additional promotion or explanation (13:0). They are also aware of particular challenges with vital components such as environmental metrics, particularly those reported by airlines: a lack of consistency in reported metrics or not enough disclosures (5:+2).

While acknowledging challenges with reporting KPIs, the viewpoint of this factor is that investors should not wait any longer for standardised reporting or more robust policy frameworks before starting to implement green deals (4: -3). They feel they are informed enough to act on the information and knowledge they already have.

Also, in contrast to the other factors, the viewpoint of Factor 1 suggests a more optimist view regarding the cost of making aviation greener by suggesting – albeit not strongly – that investors, in their pursuit of making a difference, are ready to bear the cost (3:+1).

Summary: Factor 1 can be summarised as a sense of responsibility and a more advanced understanding of sustainability issues. This group believes that ESG already matters and that we must act now and should not have to wait for outside guidance (policy, standardised KPI).

Not prepared but feeling external pressures (Factor 2)

Factor 2 explains 18% of the study variance. Nine participants are associated with Factor 2, that is, 18% of the participants in the sample contribute to defining this factor. Items that ranked highly for this factor are statements 6 (+3), 11 (+2) and 12 (+2). Moreover, for these three statements, Factor 2 ranked more highly than any other factor. The lowest ranking was obtained for statements 7 (-3), 8 (-2) and 10 (-2). For these three statements (7, 8 and 10) and several more (2, 5, 9 and 13), Factor 2 ranked lower than the other factors.

Factor 2 communicates apprehensiveness around external factors and unpreparedness for handling sustainability issues. The viewpoint of Factor 2 is that investors are aware that environmental activism has intensified and feel anxious that the time will come when they may be held accountable for failing to address the sustainability issue in aviation (6: +3). This external pressure is accompanied by a sense of unpreparedness to tackle this issue, as sustainability is still a novel challenge, and, as a group, investors are not equipped with enough expertise to make the right changes (11: +2). The sense of unreadiness is exacerbated by the challenge of sourcing the most relevant information from a large amount of information available on environmental topics (12: +2). There is too much information and too little time to figure it out. The abundance of information makes the participants believe that investors can easily obtain the information needed on sustainability performance without exerting any pressure on various stakeholders (7: -3).

These perceptions of fear of external judgement and not feeling prepared to make meaningful and impactful changes (statements 6, 11 and 12) rank Factor 2 more highly than any other factors.

Though recognising that ESG in aviation is already a critical business issue (8: -2), the participants defining Factor 2 do not currently agree with the possibility that aircraft investors may be changing their focus from short-term financial results to long-term value creation (10: -2). This view is endorsed by the relative neutrality they perceive around investors' role towards leading sustainability efforts (2: 0).

Summary: Factor 2 is outlined by external pressure: fear of accountability, a sense of feeling overwhelmed by the

new task, and too much information to figure out. This group believes that ESG already matters, although they are relatively neutral about investors' role in leading change and do not see investors motivated to change from short-term gains to long-term value creation.

Pragmatic and informed (Factor 3)

Factor 3 explains 14% of the study variance. Seven participants are associated with Factor 3, that is, 14% of the participants in the sample contribute to defining this factor. Items that ranked highly for this factor are statements 8 (+3), 4 (+2) and 9 (+2). For two of these three statements (4 and 8), Factor 3 ranked more highly than any other factor. The lowest ranking was obtained for statements 3 (-3), 6 (-2) and 10 (-2). For these three statements (3, 6 and 10) and several more (5, 11, 12 and 13), Factor 3 ranked lower than the other factors.

Factor 3 imparts a more pragmatic view of ESG. It is the only factor to strongly agree that ESG in aviation is not yet a critical business issue (8: +3). This admission is in contrast with all the other factors that view ESG as already being a critical business issue. This more gloomy view on the relevance of ESG is reinforced by the rejection of the idea that investors are ready to bear any of the costs of making aviation greener (3: -3), or changing the way they conduct business to prioritise long-term value creation instead of short-term financial results (10: -2). Also, this view is not impacted by external pressure or judgement for failing to address sustainability (6: -2). Participants who helped to define this factor strongly believe that investors should wait for a more robust policy framework and standardised reporting KPIs before acting on any deal (4: +2). In line with the bleaker view on the role of investors in sustainability, these participants believe that the responsibility is with everyone in the aviation chain and that the cost should be distributed among all participants: OEMs, passengers, airlines and investors (9: +2).

Interestingly, Factor 3 shares similar attitudes towards statements 11, 12 and 13 compared to Factor 1. Despite their rejection of responsibility – which defines Factor 1 – the participants that define Factor 3 are also a group that stays informed on sustainability-related issues. For these investors, just as those defining Factor1, sustainability is not a novel concept (11: -1); they are aware there is plenty of information on environmental topics (12: 0) and agree that the impact of sustainability on investment decisions does not require more promotion or explanations (13: 0).

Summary: Factor 3 reveals a more difficult viewpoint on sustainability from a section of investors who reject the pressing issues around ESG, ignore external pressures to take responsibility or act, and believe that investors should wait before committing to any green deal. However, while waiting, they stay informed on issues regarding sustainability and keep track of developments in this area.

Still learning (Factor 4)

Factor 4 explains 11% of the study variance. Eight participants are associated with Factor 4, that is, 16% of the participants in the sample contribute to defining this factor. Items that ranked highly for this factor are statements 13 (+3), 9 (+2) and 11 (+2). For two of these three statements (11 and 13), Factor 4 ranked more highly than any other factor. The lowest ranking was obtained for statements 3 (-3), 4 (-2) and 8 (-2). For two of these three statements (3 and 8) and two more (1 and 5), Factor 4 ranked lower than the other factors.

Factor 4 reveals a learner's viewpoint, where investors admit the novelty level that sustainability brings (11: +2) and the need for a better understanding of the impact of sustainability on investment decisions (13: +3). They admit to needing to learn more and to better understand sustainability issues, but paradoxically they deny that investors should wait before committing to any green deals for further policy development or metrics consolidation (4: -2).

Also, interestingly, Factor 4 shares some similarities with Factor 3 despite their fundamental differences. Factor 3 is defined by participants who claim to be informed on sustainability, while Factor 4 is defined by participants who admit needing more information. Yet, both reject the idea that investors alone could bear the costs of making aviation greener (3: -3), as well as sharing the view that this responsibility should be shared between the broader community of OEMs, passengers, airlines and investors (9: +2).

Summary: Factor 4 reveals a novice viewpoint on sustainability, where investors admit their lack of deeper understanding and are not yet equipped with the necessary expertise. Sustainability is perceived to require more support to communicate its impact on aviation investment.

3.2 Additional interpretation

By analysing the data, we extracted four factors that describe four existing viewpoints on sustainability by aircraft financiers. However, not all the data points collected loaded on these viewpoints. In fact, 11 respondents, that is, roughly one in five participants, did not contribute to these perspectives because they did not significantly load on any of the factors. There were no confounded Q-sorts, that is, participants to load significantly on two or more factors. The number of nonsignificant Q-sorts is interesting because it implies too many distinct thought patterns. While 39 out of the 50 participants contributed to revealing the four factors' viewpoints, the remaining 11 had such diverse perspectives that they were not significantly associated with any factor. No matter how interesting some of these 11 remaining perspectives are in themselves, they are too fragmented and remain in the minority by failing to align with other views. This suggests that there is still a broad spectrum of opinions too diverse to form a single coherent viewpoint. This, in turn, highlights the need for "one voice" for the industry, as often highlighted in conversations with industry participants. Individually, we may be too diverse in our thinking, so we need some consolidation or guidance to bring most people to a similar understanding and knowledge of sustainability issues.

This need was particularly voiced by Factor 4, explicitly defined by the admission of needing to learn more to better understand sustainability. Efforts made by various parties within the industry to share knowledge (Aircraft Leasing Ireland, IMPACT, IATA) have a role in supporting this particular requirement. Not everyone needs to be fully aligned in their thinking with certain perspectives, but perhaps the industry is currently too fragmented in their perceptions and requires some consolidation of its collective thinking.

However, there is evidence of change, and business leaders are starting to move societal concerns from the periphery to the core of their business activity. In 2018, Larry Fink, CEO and Chairman of Blackrock – the world's largest asset manager – surprised the financial community by announcing that Blackrock would only invest in companies committed to a meaningful purpose beyond profits. Fink stated in his 2020 letter to CEOs, "companies, investors, and governments must prepare for a significant reallocation of capital to fight climate change". In subsequent letters to CEOs, Fink reaffirmed his belief that "a company cannot achieve long-term profits without embracing purpose and considering the needs of a broad range of stakeholders" (Fink, 2022). There is growing evidence that portfolio firms respond to BlackRock's mobilisation efforts (Pawliczek, 2021). As this analysis indicates, aircraft investors also expressed their desire for change and and an interest in contributing to making aviation greener; however, they are not yet ready to carry any cost.

This issue could provide the rationale for future research. More examination is required on how aircraft investors – who have the power to influence capital – can be convinced to carry some of the cost.

When the author was designing the survey, none of the statements was formulated with the intention of being seen as divisive, but one particular statement appeared to have carried a factious element. Statement 8 is perceived as divisive ("ESG in aviation is not a critical business issue yet"), contrasting Factor 3 strongly against the other factors. This appears to be a conflicting view, with most leaders arguing that ESG is a critical business issue (Factors 1, 2 and 4), while others say it is not yet a critical business issue (Factor 3). The relevance of ESG is not denied by Factor 3 but postponed: the pressure is not immediate but will likely become a critical issue at some point in future.

The analysis also reveals that there is a broad acceptance of statement 2 ("*As investors, we have an essential role to play in stewarding the aviation industry towards sustainability* ") – with Factor 1 in strong agreement (+2), Factors 3 and 4 in agreement (+1), and Factor 2 in relative neutrality (0). This acceptance is a promising self-perception: investors see themselves, as a group, as having a role to play in sustainability in aviation, as well as a role as suppliers of capital.

The cluster of participants defining the four factors has no connecting characteristics. These views are spread across the entire industry, regardless of professional background, job title, gender or geographical location.

As the developments in sustainability-linked finance unfold, so too will the understanding and perceptions of those involved. This analysis is a snapshot of our current thinking, but temporality and progress should change that. Part of these results will likely change over time. The factors identified here are not permanent features of our collective thinking; these cohorts of investors may shift their thinking in other directions.

4. Conclusions

The study using Q-methodology allows us to bring to light four current perspectives regarding sustainability from the point of view of aircraft investors. The patterns identified:

- The Factor 1 (responsible and informed) majority viewpoint is grounded by responsibility, a good understanding of sustainability issues. Investors strongly believe they have role in leading change in the aviation industry towards sustainability, and show impatience regarding the need to act now without further waiting for external solutions.
- The Factor 2 (not prepared but feeling external pressures) majority viewpoint feels apprehension about external accountability – a sense of being overwhelmed by the new challenge of figuring out sustainability and the amount of information available on the subject. The pressure to act is external, nevertheless, investors are trying to find out a solution.
- The Factor 3 (pragmatic and informed) majority viewpoint is that investors, rejecting external pressure to act on sustainability, disagree that ESG is critical to their business at this stage, and believe that they should wait for better policy frameworks. Meanwhile, they stay informed and keep an eye on sustainability developments, as they are aware they must play their part towards sustainability in aviation at some point.
- The Factor 4 (still learning) majority viewpoint is defined by the disclosure of investors' lack of solid knowledge of sustainability issues and the need to build more expertise to better understand the impact of sustainability on investment decisions, knowing they have a role to play in helping the aviation industry towards sustainability.

Further conclusions are as follows:

- There is a broad acceptance of the role in guiding the aviation industry towards sustainability.
- There is some divisiveness regarding the importance of ESG in aviation; most investors believe it is already a critical business issue, while a minority believes that this is not yet the case.
- The remaining views are very fragmented, suggesting the need for consolidation of knowledge.

The author acknowledges that the way this study was conducted and the statements selected to represent the discourse on sustainability are not unique. The conclusions only represent a general line of thought at present. It may change with time, which can only be understood by repeating such studies.

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Declaration of competing interest

The author is affiliated with FPG Amentum Limited, an aircraft leasing company. The opinions expressed in the article do not necessarily reflect those of FPG Amentum Limited, its subsidiaries, affiliates, owners, and employees. The author of this article is solely responsible for its content. The author does not identify any potential conflict of interest in this research paper.

APPENDIX A – Original Data

Statements (col) Respondents (row)	1	2	3	4	5	6	7	8	9	10	11	12	13
1	-2	-1	-3	1	0	2	2	1	-2	-1	3	0	0
2	-2	-1	-3	1	2	-2	0	1	0	-1	2	0	3
3	1	2	0	-2	1	3	-1	-3	2	-2	0	0	-1
4	0	-2	-1	2	2	1	-2	-3	3	0	0	-1	1
5	0	2	-2	1	-1	-3	0	3	2	-2	-1	0	1
6	0	1	-2	2	0	2	-1	-2	3	-3	1	0	-1
7	1	2	-1	-2	-2	-1	2	-3	1	0	0	0	3
8	2	1	-1	3	0	1	-2	-2	2	-3	0	0	-1
9	2	1	-2	-2	0	0	-3	-1	3	-1	1	2	0
10	-2	1	0	-2	2	3	-1	-3	2	0	-1	0	1
11	-2	-2	-1	-1	2	1	1	2	3	-3	0	0	0
12	-1	1	0	3	0	2	-3	-2	1	-2	-1	0	2
13	2	-2	-1	-1	2	3	0	0	-2	-3	0	1	1
14	-1	1	-3	-1	0	2	-2	-2	0	0	2	1	3
15	1	3	1	-2	0	2	-2	-3	2	0	-1	-1	0
16	1	0	2	-2	1	0	-3	-1	3	-1	0	-2	2
17	1	2	-1	0	-2	2	0	-2	1	-1	0	3	-3
18	-1	2	-2	3	0	1	-2	-3	2	0	-1	0	1
19	0	2	-3	-2	0	0	-1	-2	2	-1	1	1	3
20	-2	2	0	-2	1	1	-1	-3	3	-1	0	2	0
21	0	2	1	-2	1	-2	-3	0	3	0	-1	2	-1
22	0	1	-3	2	0	-2	1	3	2	-1	-2	0	-1
23	-2	2	1	-1	-2	1	-3	-1	3	0	0	2	0
24	1	3	0	-3	2	0	-2	0	2	-2	-1	-1	1
25	0	-2	0	0	-2	-3	1	-1	1	2	3	-1	2
26	0	1	-3	0	0	-1	-2	-2	2	-1	3	1	2
27	-2	2	-1	-1	1	0	-2	0	3	-3	0	2	1
28	-1	2	-1	-3	0	1	-2	-2	3	0	1	0	2
29	1	0	-2	0	0	2	-1	-3	-2	-1	2	3	1
30	1	3	0	-1	2	-1	-3	-2	1	-2	0	0	2
31	2	2	-1	-3	1	0	1	-2	3	-2	-1	0	0
32	0	3	-1	-2	0	0	-1	-3	2	2	1	1	-2
33	2	3	0	-2	2	-1	0	1	1	-3	0	-1	-2
34	-2	3	1	-3	0	-1	2	-1	0	-2	0	1	2
35	-1	-2	0	2	-2	2	3	1	1	-1	0	0	-3
36	1	2	-3	2	-2	0	-1	3	1	-2	-1	0	0
37	-1	1	-3	0	2	2	0	-2	3	-2	-1	1	0
38	1	0	-2	-1	0	2	-3	-2	0	-1	3	2	1
39	0	2	-3	2	1	0	-1	0	3	-2	1	-1	-2
40	0	-2	-3	2	0	3	0	2	-2	-1	1	1	-1
41	0	1	-3	-1	-2	0	0	-1	2	-2	3	2	1
42	2	-2	-3	-2	1	0	0	-1	2	3	1	-1	0
43	1	-1	0	3	0	2	-3	-1	-2	-2	2	1	0
44	0	2	-1	-2	-2	3	-1	0	1	-3	0	1	2
45	1	0	-3	-1	0	1	-1	2	3	-2	-2	2	0
46	3	0	-1	-2	2	1	-1	-3	2	0	-2	1	0
47	3	0	-1	0	0	2	-1	-2	-2	-3	2	1	1
48	-1	0	-1	1	1	0	-2	2	3	-3	2	-2	0
49	-2	0	0	1	0	2	-3	-2	2	-1	3	1	-1
50	1	0	0	-2	-1	-2	-3	0	3	-1	1	2	2

APPENDIX B – Simulation Results

Summary	*f1*	*f2*	*f1*	*f2*	*f3*	*f1*	*f2*	*f3*	*f4*	*f1*	*f2*	*f3*	*f4*	*f5*
Avg. reliability coefficients	.80	.80	.80	.80	.80	.80	.80	.80	.80	.80	.80	.80	.80	.80
Number of loading Q-sorts	20	16	20	11	7	15	9	7	8	14	7	7	8	3
Total loading Q-sorts	36		38			39				39				
% explained variance	22.95	21.81	23.03	18.94	14.08	21.86	17.79	13.57	11.38	21.94	12.98	12.73	12.05	11.82
Total explained variance	44.76		56.05			64.6				71.52				
SE of factor scores	*.11*	*.12*	.11	.15	.19	.13	.16	.19	.17	.13	.19	.19	.17	.28

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