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Visual Framing of the Low-Altitude Economy in English-Language News: A Cross-Regional Comparison Through Multimodal Analysis of Text-Image Relations

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Abstract: This study examines English-language news reports on the same low-altitude aviation events published across regions. Using textual statistics, visual framing analysis, and multimodal discourse analysis, it compares the concepts emphasized in the reports, their image choices, and the relationships between text and images. The findings show that different outlets focus on technological validation, urban mobility, operational rules, and cargo applications. Most images depict aircraft, while a photograph of a rule-signing scene and a planning diagram introduce regulatory action and future service plans. Text and images jointly shape the meaning of an event by reinforcing, extending, or shifting its emphasis. Changes to the text and images in reports republished from the same source show why visual frames must be examined in the versions that audiences actually see. The study offers a case-based perspective on the cross-regional presentation of emerging aviation issues.

Keywords: Low-altitude economy; English-language news; Visual framing; Text-image relations; Multimodal discourse analysis

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1. Introduction

The low-altitude economy has emerged as an area where civil aviation and new industries converge, as well as a topic in international news. In China, the 2024 Government Work Report identified the low-altitude economy as a new growth driver [1]. In Europe, the European Commission introduced measures concerning new forms of air mobility and drone operations in 2024 [2]. Differences in concepts and regulatory contexts make coverage of these activities suitable for cross-regional comparison.

As these activities remain in stages of technological development and commercial exploration, news

reports must address practical questions about their uses and implications. Headlines, leads, quotations, and background information guide readers' understanding, while photographs show aircraft, test flights, potential uses, and people involved. Text and images may reinforce or complement each other, but they may also direct attention to different aspects of an event. Republished versions of the same story can even use different images. An analysis of text alone therefore cannot fully explain how the low-altitude economy is presented in news coverage.

Previous cross-cultural studies of multimodal news have examined how language and photographs jointly construct news value [3]. Cross-regional comparisons of visual news also show that image choices must be understood in their media contexts [4]. Reports on the emerging low-altitude economy bring together technical, commercial, and governance concerns. This study compares the visual frames of English-language reports on the same events across regions and examines how text and images jointly construct their meaning.

2. Literature review and theoretical framework

2.1. Visual framing and cross-regional comparison

Visual framing concerns both what an image depicts and how its elements are organized in relation to a news story. Comparing images of Afghan women in Chinese, American, and Russian media, Zhao *et al.* analyzed denotation, technical style, and connotation [5]. Their study shows why cross-regional comparison must consider reporting context rather than merely count image types.

In their study of news posters, Wu and Liu examined themes, depictions of people, headline structure, text-image combinations, color, and information density [6]. Although posters differ from ordinary news images, their distinction between image content and presentation helps inform this study's coding. Tian further noted that the interpretation of visual elements also involves selective attention, frame comparison, and disambiguation [7]. Image subjects must therefore be interpreted alongside headlines, captions, and article text.

2.2. Multimodal discourse and text-image meaning

Multimodal discourse analysis examines how text and images produce meaning within a shared communicative setting. Xiao argued that verbal and nonverbal resources should be understood as a system rather than analyzed separately and then added together [8]. Dai and Miao likewise emphasized the selection of signs, the views they foreground or leave implicit, and their combined effects [9]. This study therefore treats news images as part of the report and examines their relations with headlines, leads, body text, and captions.

Wang combined visual grammar with text-image analysis to examine how *Beijing Review* covers construct an image of science and technology [10]. Studying English-language news on China's "dual-carbon" goals, Cui showed that images and their relationship with text also matter in coverage of technical and policy issues [11]. The studies above provide a methodological basis for this study.

Ordinary news reports may use photographs supplied by reporters, institutions, or news agencies. Outlets may also change an image or headline when republishing a story. Accordingly, this study uses each published news page as its unit of text-image analysis, recording image sources, captions, and article text before assessing how they work together.

2.3. Research gaps and questions

Existing research provides tools for analyzing visual frames and multimodal meaning, but two issues require

attention in English-language news on the low-altitude economy. First, the terms eVTOL, air taxi, and powered-lift refer respectively to an aircraft type, a service, and a regulatory category. Different terms may frame different news questions. Reports must therefore be compared with attention to their subjects and levels of reference.

Second, apparent regional differences may reflect the events selected, outlet types, or shared news-agency material. This study compares reports on the same events and records republication relationships so that agency content is not automatically attributed to a republishing outlet's editorial position. It asks: (1) How do outlets in different regions define low-altitude aviation activities in text? (2) How do they select and organize images of the same event? (3) How do text and images jointly reinforce, extend, or shift a report's emphasis?

3. Research design

3.1. Corpus and units of comparison

The corpus consists of English-language news reports on low-altitude aviation published by different types of outlets in China, the United States, Europe, and other parts of Asia. It covers drone cargo transport, eVTOL and air taxis, test flights, commercial applications, and operating rules. An outlet's region is defined by where the outlet is based; it does not indicate where a story originated or an author's nationality.

Reports were selected for their substantive connection to low-altitude aviation, whether or not they used the term low-altitude economy. Published webpages and saved texts were used to verify headlines, outlets, dates, and article text. The study also records whether a report contains images and, where applicable, checks the images, captions, and their position on the published page. Reports without images remain in the comparison of presentation choices but are not assigned an image-based visual frame.

To limit differences caused by the events themselves, the study compares reports on three shared events: Dubai air-taxi test flights, the US Federal Aviation Administration's powered-lift operating rules, and the first flight of a large Chinese cargo drone. Each published report is an analytical unit, while each event provides a unit for comparison across outlets. Republished stories are retained as distinct published versions so that changes to headlines and images can be examined. Their original sources are recorded, and near-identical news-agency text is not treated as independent evidence of different textual narratives.

3.2. Analytical dimensions

The analysis covers textual narrative, visual framing, and text-image relations. Textual analysis considers vocabulary, sentence structure, and terminology. Article word counts follow the measure used in the database. Word frequencies, aviation terms, evaluative language, sentence counts and lengths, subordinate clauses, and active or passive constructions provide descriptive clues. Counts of source-attribution cues are preliminary; the number and identity of cited sources are checked against the articles. Terms for industries, aircraft, regulatory categories, and services are interpreted in context, with claims about standard usage checked against authoritative terminology. No single count determines a news frame: headlines, leads, article text, and quotations are read together to identify each report's emphasis.

Visual analysis first distinguishes reports with and without images. For illustrated reports, it records depicted subjects and settings as well as shot distance, angle, and composition. These features are interpreted alongside captions, article themes, and image placement. An image of an aircraft or test flight is evidence

for interpretation, but its subject alone does not establish a frame such as "technological breakthrough" or "commercial prospects."

Text-image analysis compares the headline, lead, body text, image, and caption on each published page to identify whether they reinforce, extend, or shift the report's emphasis. For reports without images, it examines how the text presents the aircraft, test, or intended use on its own. Published versions of the same news-agency story are also checked for changes in headlines and images. Visual frames and text-image relationships are determined only after image coding and page verification.

3.3. Procedure and scope of interpretation

The study first organizes reports by source, topic, and terminology, then closely reads reports on the same events. Image coding and page checks are followed by a report-by-report comparison of visual and textual findings. Regional comparisons take account of outlet location, outlet type, and story origin; an individual outlet's choices are not generalized to an entire country.

The study examines how news content is presented. It does not measure audience responses or infer editorial intentions. Interpretations of visual meaning rest on verifiable images, text, and publication context, and any implications for international communication are limited to reporting practices rather than claims about communication effects.

4. Findings and analysis

4.1. Textual narratives as context for visual framing

The three event groups show why visual frames must be read against the questions raised by each report. Terms such as low-altitude economy, eVTOL, powered-lift, and air taxi refer to an industry, an aircraft technology, a regulatory category, and a passenger service, respectively. Treating them as interchangeable would obscure whether a story concerns industrial development, technical testing, regulation, or use. Textual counts helped identify differences for closer reading, **Table 1** lists representative English expressions directly related to each event.

Table 1. Comparison of key terms used in reports

Event	Country or region	Media outlet	Representative English terms (counts of occurrences)
Dubai air taxi test flight	China	Xinhua	air taxi (1); aerial taxi (1)
		China Daily	air taxi (3); electric vertical takeoff and landing (2)
	United Arab Emirates	Khaleej Times	air taxi (1); eVTOL (1)
		The National	air taxi (4); aerial taxi (2)
	Europe	AeroTime	eVTOL (4); urban air mobility (1)
	United States	FLYING Magazine	air taxi (9); eVTOL (5)
	China	CGTN	air taxi (4); powered-lift (3)
Introduction of U.S. powered-lift aircraft operating rules	India, republishing U.S. reporting	The Economic Times, republishing AP	air taxi (4)
	Europe	AeroTime	powered-lift (6); eVTOL (4)
	United Kingdom	The Register	powered-lift (7); air taxi (1)
	United States	AP	air taxi (4); powered-lift (1)
	United States	TechCrunch	powered-lift (4); air taxi (2)

Event	Country or region	Media outlet	Representative English terms (counts of occurrences)
Maiden flight of China's large cargo drone	China	China Daily	cargo drone (2); unmanned cargo plane (1)
	India, republishing U.K. reporting	The Economic Times, republishing Reuters	cargo drone (3); low-altitude economy (2)
	Malaysia, republishing U.K. reporting	Free Malaysia Today, republishing Reuters	cargo drone (3); low-altitude economy (2)
	United Kingdom	The Loadstar	UAV (2); cargo drone (1)
	United Kingdom	The Sun	low-altitude economy (2); cargo drone (1)
	United States, republishing U.K. reporting	Voice of America, republishing Reuters	cargo drone (5); low-altitude economy (2)

Coverage of the Dubai air-taxi test flight emphasized either a future urban service or an early technical step. *Xinhua* linked the successful flight to Dubai's transport plans, while *China Daily* illustrated possible travel-time savings and noted that initial fares might limit access. *Khaleej Times* and *The National* focused on proposed routes, booking, and prices. *AeroTime* and *FLYING Magazine* stressed the certification and infrastructure work still needed. Thus, the same successful test could signal a possible urban service or a technical step with substantial work still ahead.

Reports on the US powered-lift rule likewise varied in focus. *CGTN* and *The Associated Press* introduced it through air taxis, while *AeroTime*, *The Register*, and *TechCrunch* gave greater attention to operating requirements, certification, or business plans. *The Economic Times* edited its version of the AP report, so the two versions do not represent independent positions. The rule established a regulatory path; it did not certify a particular aircraft for passenger service.

For China's large cargo drone, *China Daily* reported the first flight and specifications before discussing possible uses. Three Reuters-based publications shared much of the same account and therefore do not constitute three independent regional narratives. *The Loadstar* considered freight costs and range, whereas *The Sun* emphasized a broader transport future that the first flight could not establish. These differences inform the comparison of each outlet's selected images.

4.2. Visual framing: Image choice and presentation

Of the 18 published versions examined, 16 contained static images, and two did not. The illustrated reports used 27 images: 12 in the Dubai group, six in the FAA-rule group, and nine in the cargo-drone group. Twenty-three images centered on aircraft; the remaining four showed a person, a regulatory signing, a location map, and an infographic of aircraft specifications. The prominence of aircraft gives readers a visible object for activities that are still being tested, certified, or developed. The image subject alone, however, does not determine a visual frame.

The two reports without static images—*Xinhua*'s Dubai story and *The Register*'s account of the FAA rule—presented the event through text. Their lack of images is a feature of the published pages, but it does not establish an editorial intention. Among illustrated reports, scenes and presentation choices brought different aspects of the same event forward. Dubai flight photographs made the aircraft and test visible, while *The National*'s map directed attention to the planned locations of a future service. For the FAA rule, most outlets used aircraft photographs, whereas *AeroTime* also showed a signing scene, making regulatory action visible. Cargo-drone photographs generally showed the large fixed-wing aircraft in a hangar, on a runway,

or in flight. *The Sun* added an infographic emphasizing its size and carrying capacity. These choices shifted attention among the aircraft, the institutions acting on it, and its possible applications.

4.3. Text-image relations and republication

Across the sample, text and images related to each other in three recurring ways: reinforcement, extension, and a shift in emphasis. Images reinforced text when photographs of the Dubai test flight or the large cargo drone gave visible form to the aircraft and activities described in words. They extended text when *The National*'s location map made a proposed service network more prominent, or *AeroTime*'s signing image brought the institutional act behind the FAA rule into view.

A shift in emphasis appeared in *The Economic Times*'s *Reuters*-based report on the Chinese cargo drone. Its text discussed a large fixed-wing aircraft, but its image showed a small multirotor drone. Both concern unmanned aviation, yet the first object readers see represents a broader category rather than the specific aircraft in the story. The image therefore changes the most immediate visual impression of the technology being reported.

Republication makes these relationships particularly important. *The Associated Press* account of the FAA rule lost some regulatory explanation in *The Economic Times*'s version and appeared with a different image. *Reuters*-based cargo-drone stories likewise retained a shared source narrative while using different photographs: *Free Malaysia Today* showed the large aircraft in a hangar, *Voice of America* showed it on a runway, and *The Economic Times* showed the smaller drone. A shared source does not guarantee a shared visual frame. The published version is therefore the appropriate unit for judging what the text and image together make most visible.

5. Discussion

Aircraft images predominate, and particular image choices can also make regulatory developments visible. Although the three events differ, aircraft are the most common subjects in their accompanying images. Photographs make the technology recognizable and give test flights and possible applications a concrete form. They do not, however, make operating requirements or certification status equally visible. In most reports on the US aviation rule, these matters are explained in text; the photograph of a rule-signing scene is an exception that brings regulatory action into the image. This finding supports the need to examine different semiotic resources within the same context [8].

Text-image relations help distinguish the different stages of an event. Test flights, the publication of a rule, and a first flight are developments that have occurred; routine services, proposed fares, large-scale cargo operations, and certification of particular aircraft remain future possibilities or processes in progress. Images make aircraft and locations visible, while text can specify the timing and conditions of these developments. Text-image analysis must therefore consider the stage each element presents, not simply whether text and image refer to the same subject.

Cross-regional differences need to be understood through the versions published by individual outlets. Dubai-based outlets connected the test flight to proposed stations, booking, and prices, whereas specialist aviation outlets focused on flight transitions and certification. The contrasting accounts of the cargo drone in the UK's *The Loadstar* and *The Sun* also show that differences do not align neatly with national boundaries. Audience, editorial focus, and story source all shape what text and images emphasize. Republication makes

the published version especially important: the *Associated Press* story was shortened and given a different image by *The Economic Times*, while outlets republishing the *Reuters* cargo-drone story made textual changes and used images ranging from a large fixed-wing aircraft to a small multirotor drone. Shared source material can thus produce different published pages. Counting these versions as independent regional textual narratives would exaggerate their differences; comparing their pages instead shows how editing and image selection reshape emphasis.

These findings have implications for English-language news reporting on the low-altitude economy. Reports should distinguish the *low-altitude economy* as an industry topic, *eVTOL* as an aircraft technology, *powered-lift* as a regulatory category, and *air taxi* as a service. Images and captions should identify the aircraft or scene shown and its relationship to the reported event; illustrative images should be labeled as such. Text beside a test-flight photograph, planning map, or rule-signing image should also clarify what has been completed and what remains planned, under construction, or subject to certification. When a republished story receives a new image, checking the headline, caption, and body against it can help keep the published version consistent. These can enhance the clarity of reporting.

6. Conclusion and future research

Using three groups of English-language reports on the same events, this study compared textual narratives, image choices, and text-image relations in coverage of low-altitude aviation. Reports defined events through industry concepts, aircraft categories, regulatory terms, and service names. Most images centered on aircraft, while images of people, a regulatory signing, a location map, and aircraft specifications brought actors, institutional developments, and future applications into view. Text and images reinforced, extended, or shifted a report's emphasis. Edits to text and changes of image in stories republished from the same source showed that a shared news source does not necessarily produce the same emphasis on the final published page. For an emerging topic such as the low-altitude economy, text-image analysis needs to distinguish demonstrated results from future plans and check whether an image depicts the specific aircraft and stage of development discussed in the text.

The study is limited by its small sample of three events and uneven coverage of outlet regions and types. Its findings explain patterns observable in these reports but cannot characterize national media coverage as a whole. Republished stories also share source material, so their texts are not fully independent. Future research could examine more events, outlets, and time periods, and study how different text-image combinations affect readers' understanding of technological progress, regulatory conditions, and possible applications.

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