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Public Company Disclosures of Space-related Risks

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ABSTRACT

Space situational awareness and planetary defense would likely receive additional private and governmental resources if public company disclosures reported extensive space-related risks. This paper analyzes trends and potential omissions in publicly listed company space-related disclosed risks such as space access, solar flares, space debris, terrestrial loss of space-system capabilities, and spectrum conflicts. A partial explanation for underreporting includes reliance on historical precedence for risk identification, materiality, and treatment. As space-related risks are realized in the coming years, corporate disclosure of associated risks may increase in a similar fashion to other risk categories that rapidly grow after a first instance is recognized. Another factor is the perception that cis-lunar space is a global commons and can therefore be misconstrued as costless. As the use of other global commons gain attention, such as carbon emissions in the atmosphere and resource use in international waters, increased scrutiny of space commons risks could occur.

Public company risks acknowledged in U.S. Securities and Exchange Commission (SEC) form 10-k item 1A “Risk Factors” are generally growing more sophisticated with the greater incorporation of Environmental, Social, and Governance (ESG) considerations spurred on by SEC rules “The Enhancement and Standardization of Climate-Related Disclosures for Investors” and “Cybersecurity Risk Management, Strategy, Governance, and Incident Disclosure.” However, space-related risks remain largely absent in SEC annual filings. This paper highlights industry sectors that should consider conducting focused materiality assessments of space-related risks and associated disclosures.

I. Introduction

Company annual reports pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934 (i.e. 10-K’s) are required to have item 1A Risk Factors [1]. These risk factors contain “a discussion of the material factors that make an investment in the registrant or offering speculative or risky” [2]. This information is deemed so

important by the U.S. Securities and Exchange Commission (SEC) that it is included at the beginning of a 10-K right after item 1 Description of business.

10-K item 1A risk factors are specific to each company based on materiality. Materiality in this context is defined as “those matters as to which an average prudent investor ought reasonably to be informed before buying or selling any security of the particular company” [3]. This U.S. securities definition of materiality is not universal, as the European Union (EU) has adopted the concept of double materiality especially in the context of corporate greenhouse gas emissions. Per the EU, double materiality means to report both on the traditional U.S. securities definition of materiality as well as the “impacts of the activities of the undertaking on people and the environment” [4]. However in this paper risk materiality will remain aligned with U.S. securities regulation.

The SEC’s “Cybersecurity Risk Management, Strategy, Governance, and Incident Disclosure” rule made final in 2023 affects 10-K risk reporting [5]. The rule does not impact this paper’s analysis as the first 10-K’s reporting under it are published in 2024. However further analysis of space-related risk reporting is warranted once the new rule is fully implemented as companies may disclose space-related cybersecurity risks. The SEC’s “The Enhancement and Standardization of Climate-Related Disclosures for Investors” rule made final in 2024 will also affect 10-K reporting but it is too early to tell if companies will include any space-related climate risks [6].

Company item 1A risk topics and wording remain largely consistent year over year. In addition, companies in related industries share similar item 1A risk topics. However the recent cybersecurity and climate-related SEC rules are likely to drive greater change to corporate risk disclosures than in previous years. The analysis in this paper sets a baseline for space-related risks at a time when a small group of companies are reporting on them but it is not yet prevalent.

II. Analysis of 10-K Space-related Risks

This analysis of Fortune 150 companies encompasses over $24 Trillion dollars of market capitalization. Together they include thousands of risk factors from operational, strategic, financial, reputational, environmental, cybersecurity, compliance, and legal categories. The diversity of risks and coverage of companies allowed for an analysis of how space-related risks are understood by a wide swath of the U.S. economy.

A. Fortune 150 Space-related Content Analysis

10-K risk analysis was conducted on the Fortune 150 companies as of January 4, 2024. The Fortune 150 are the publicly listed companies on United States stock exchanges with the most revenue. The 10-K’s analyzed were of fiscal year 2022. Ten Fortune 150 companies did not release a fiscal year 2022 10-K per Securities and Exchange Commission (SEC) rules however the analysis below holds whether the Fortune 150 (with ten companies not reporting) or the Fortune 160 (with 150 company 10-K’s reported) are included. This is due to the Fortune 151 to 160 companies not including any space-related information in their 2022 10-K’s. The

classification of space-related risks and information was conducted without the use of artificial intelligence.

Table 1 shows that 12 companies (8%) included space-related risks and 25 companies (16.7%) included space-related disclosure outside of their 1A risk section in 2022. Two companies included space-related risks but no other space-related information, while 15 companies included space-related information but no space-related risks.

Table 1. Fortune 150 Companies with Space-related Disclosures in 2022 10-Ks.

Company (In Order of Fortune Ranking on 1/4/2024)	Company Sector	Space-related Risk in Item 1A	Space-related Disclosure Outside of Item 1A
Amazon	Internet Services and Retailing		X
Microsoft	Computer Software		X
Verizon Communications	Telecommunications		X
Comcast	Telecommunications	X	X
AT&T	Telecommunications		X
United Parcel Service	Mail, Package and Freight Delivery		X
FedEx	Mail, Package and Freight Delivery		X
Walt Disney	Entertainment		X
Goldman Sachs	Commercial Banks	X	
Raytheon Technologies	Aerospace & Defense	X	X
Boeing	Aerospace & Defense	X	X
Lockheed Martin	Aerospace & Defense	X	X
Charter Communications	Telecommunications	X	X
Deere	Construction and Farm Machinery	X	X
Allstate	Insurance: Property and Casualty		X
American Airlines	Airlines	X	
Qualcomm	Semiconductors and Other Electronic Components		X
General Dynamics	Aerospace & Defense		X
Travelers	Insurance: Property and Casualty	X	X
Northrop Grumman	Aerospace & Defense	X	X
Honeywell International	Electronics, Electrical Equip.		X

Table 1 Continued. Fortune 150 Companies with Space-related Disclosures in 2022 10-Ks.

Warner Bros. Discovery	Entertainment	X	X
Broadcom	Semiconductors and Other Electronic Components		X
Uber Technologies	Internet Services and Retailing	X	X
Netflix	Entertainment		X
Paramount Global	Entertainment		X
Duke Energy	Utilities: Gas and Electric		X
	Total	12	25

Space-related item 1A risks consisted of competition from and regulation of satellite communications, competition for space products/services, financial losses associated with the uncertainty of space operations, damage from solar flares, and reliability of the U.S. Global Positioning System (GPS). The solar flare risk related to insurance likely for damage from a geomagnetic storm [7]. There were no risks related to space-based Earth observation. There were also no risks that referenced the Kessler Syndrome or a potential for low earth orbit to become unusable due to debris [8].

The space-related information disclosed outside of item 1A related to satellite communications, regulation of electromagnetic spectrum, use of GPS, insurance risks, Earth observation, and business directly related to space operations (e.g. satellite operations, launch, space-based computing). There was no reference to space In-Situ Resource Utilization (ISRU), cislunar economy, or space-based quantum communications [9].

B. Sector Analysis

As Table 2 shows, space-related disclosure was largely grouped into a cluster of sectors. Sectors with 100% of companies reporting space-related information were: Aerospace & Defense; Electronics, Electrical Equip.; Entertainment; Mail, Package and Freight Delivery; and Telecommunications. The majority of space-related disclosure, 16 of 27 or 59.3%, were grouped into these five sectors. The remaining 11 companies were spread across 8 sectors that had 50% or less of their companies reporting space-related information, as seen in Table 3.

Table 2. Fortune 150 Sectors with Space-related Disclosures in 2022 10-Ks.

Company Sector (In Alphabetical Order)	Space-related Disclosure Information
Aerospace & Defense	5/5
Airlines	1/3
Apparel	0/1
Automotive Retailing, Services	0/4
Beverages	0/1

Table 2 Continued. Fortune 150 Sectors with Space-related Disclosures in 2022 10-Ks.

Chemicals	0/2
Commercial Banks	1/9
Computer Software	1/3
Computers, Office Equipment	0/4
Construction and Farm Machinery	1/2
Diversified Financials	0/4
Electronics, Electrical Equip.	1/1
Energy	0/2
Entertainment	4/4
Financial Data Services	0/2
Food and Drug Stores	0/3
Food Consumer Products	0/3
Food Production	0/2
Food Services	0/1
General Merchandisers	0/4
Health Care: Insurance and Managed Care	0/5
Health Care: Medical Facilities	0/1
Health Care: Pharmacy and Other Services	0/2
Homebuilders	0/2
Household and Personal Products	0/1
Industrial Machinery	0/2
Information Technology Services	0/1
Insurance: Life, Health	0/2
Insurance: Property and Casualty	2/5
Internet Services and Retailing	2/4
Mail, Package and Freight Delivery	2/2
Medical Products and Equipment	0/2
Metals	0/1
Mining, Crude-Oil Production	0/3
Motor Vehicles & Parts	0/4
Network and Other Communications Equipment	0/2
Petroleum Refining	0/7
Pharmaceuticals	0/8
Pipelines	0/4
Railroads	0/1
Real Estate	0/1
Scientific, Photographic and Control Equipment	0/1
Semiconductors and Other Electronic Components	2/6
Specialty Retailers: Apparel	0/1
Specialty Retailers: Other	0/5
Telecommunications	4/4
Tobacco	0/1
Transportation and Logistics	0/1

Table 2 Continued. Fortune 150 Sectors with Space-related Disclosures in 2022 10-Ks.

Utilities: Gas and Electric	1/2
Wholesalers: Electronics and Office Equipment	0/2
Wholesalers: Food and Grocery	0/4
Wholesalers: Health Care	0/3
Total	27/150

Table 3. Percentage of Companies in Fortune 150 Sectors with Space-related Disclosures in 2022 10-Ks.

Sectors	% of Companies Disclosing Space-related Information
Aerospace & Defense	100.0%
Electronics, Electrical Equip.	100.0%
Entertainment	100.0%
Mail, Package and Freight Delivery	100.0%
Telecommunications	100.0%
Construction and Farm Machinery	50.0%
Internet Services and Retailing	50.0%
Utilities: Gas and Electric	50.0%
Insurance: Property and Casualty	40.0%
Airlines	33.3%
Computer Software	33.3%
Semiconductors and Other Electronic Components	33.3%
Commercial Banks	11.1%

All sectors with 100% adoption of space-related information were either involved directly in the space economy; delivery of information or media; or GPS-dependent. All Entertainment companies acknowledged risks related to satellite communications.

The Airlines sector was an interesting area of differentiation, with only 1 of 3 companies mentioning the NextGen Air Transportation System upgrade migrating U.S. air traffic control from terrestrial radar systems to a GPS-reliant system. Other sectors with differentiation could be caused by either differences in constituent company's reliance on space or in their quantification of the likelihood and impact of associated risks.

C. Effect of Space's Designation as a Commons on Risk Disclosure

A potential factor affecting the disclosure of space-related risks is the designation of space as either a commons or not. Space is traditionally designated a global commons in international law along with the atmosphere, international waters, and Antarctica. However the U.S. government explicitly designated space as not a commons in 2020 [10]. This is in spite of the Outer Space Treaty, to which the U.S. is a member, agreeing that space has the attributes of a commons [11]. The

changing conception of space as a commons may affect corporate space-related risk assessments. 10-K reports are discouraged from including generic risk factors and commons-related risks may be perceived as generic [2]. If space-based economic activity, such as ISRU, erode space's perception as a commons an increase in space-related risk disclosures is likely.

III. Conclusion

While a relatively small number of Fortune 150 companies list space-related 10-K risk factors (8%), approximately twice as many include space-related information outside of their risk factors. This indicates that material space-related business activities are currently more prevalent than space-related material risks. This may partially be due to the fact that space-related business activities are relatively new and associated risks have not had time to materialize into experiences that drive enterprise risk identification. As companies review peer 10-K's and some space-related risks are realized it is likely that the rate of companies disclosing space-related risks will grow.

Another area where space-related risk disclosure may manifest is in corporate sustainability reporting. The International Sustainability Standards Board (ISSB) and the EU Corporate Sustainability Reporting Directive (CSRD) are two examples of regulated non-financial reporting that use double materiality [4, 12]. Within the framework of double materiality, impacts on space sustainability would likely fall under the "environment" and analysis of space-related corporate sustainability reporting is recommended for future research.

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