COVE

WHITE PAPER:

THE CANADIAN OCEAN ENTERPRISE 2024

In 2020, COVE conducted the first comprehensive study of Canada's Ocean Enterprise, culminating in the release of the first Canadian Ocean Enterprise 2020 White Paper[1]. This baseline report provided a comparative analysis of Canada's Ocean Enterprise with those of the United Kingdom and the United States. Building on these findings, COVE published the Canadian Ocean Enterprise 2022 White Paper which highlighted the growth and dynamism of the sector. The information gleaned from these studies has been invaluable, providing data that augments our understanding of the sector, and provides a glimpse into the future of Canada's Ocean Enterprise companies.

[1]COVE, "White Paper: The Canadian Ocean Enterprise 2020". Published 2021 https://coveocean.com/wp-content/uploads/2024/09/COVE-2020-White-paper.pdf

EXECUTIVE SUMMARY

The Canadian Ocean Enterprise 2024 White Paper is a comprehensive report that examines Canada's industry within the global context. While this year's White Paper references studies from 2020 and 2022, it stands as an independent report. New questions introduced to this year's survey of Canada's Ocean Enterprise companies uncovered valuable insights not previously explored, enhancing the report's usefulness for international comparisons.

The term "Ocean Enterprise" refers to businesses and organizations involved in developing, producing, and utilizing technology and services that support ocean-related activities and industries. Since COVE's initial survey in 2020, the Canadian Ocean Enterprise has seen significant growth in the number of companies, as well as in revenue and employment, with expectations for continued expansion in the coming years. Understanding the characteristics of the Ocean Enterprise provides critical insights into how and where these companies are developing, laying the groundwork for further strengthening the ecosystem.

The optimism expressed by respondents indicates a strong belief in the potential for continued growth in the ocean sector. This positive outlook highlights the sector's growing significance in the broader economy, as it fosters sustainable development and responsibly utilizes ocean resources.

As more government agencies, non-profit organizations, and private foundations support the companies that develop ocean-related technologies and services, these businesses are likely to attract greater attention from stakeholders and investors, further underscoring their relevance and impact on economic growth and environmental sustainability.

Future studies should focus on understanding the barriers companies face in exceeding the $50 million revenue mark. Additionally, it is important to examine the activities conducted in key export markets such as the United Kingdom, Australia, and South America to identify trends and gain insights into why these markets are valuable to Canadian Ocean Enterprise companies. With significant investments driving growth in the ocean sector, it will be crucial to determine how these investments can be most effectively utilized to sustain this growth.

KEY FINDINGS

1. The number of identified Ocean Enterprise companies **increased from 160 in 2022 to 209 in 2024, representing a 31% increase**, similar to the growth experienced between 2020 and 2022. All identified provinces experienced growth except for Alberta which remained constant. **Nova Scotia – home to 1 in 3 companies identified within Canada's Ocean Enterprise – experienced the most growth in absolute number of companies from 49 companies in 2022 to 75 in 2024, a 53% increase.**

2. **British Columbia (BC), Newfoundland & Labrador (NL) and Nova Scotia (NS) are home to 75% of Canada's Ocean Enterprise**. In BC, the top customer sectors are academic research, ecosystem monitoring, government research, and defence. In NL, the top customer sectors are defence, oil & gas, government research, and academic research. In NS, the top sectors are academic research, defence, fishing, and ports & harbours.

3. Canada's Ocean Enterprise is experiencing significant growth. **In 2024, estimated revenue is projected to be between $1.8 billion and $2.0 billion, and it employs over 8,000 people**. This represents a 33% increase in the number of employees and a 58% increase in revenue compared to the 2020 study, which estimated revenue between $1.1 billion and $1.3 billion and employment at 6,000. There is increased optimism for continued growth in the next 12 months, with 83% of respondents expecting an increase in revenue and 73% anticipating a rise in the number of employees.

4. **The most common uses of Artificial Intelligence (AI) among respondents are in Data Analysis & Management and Research & Development**. Over the next 24 months, AI adoption is expected to expand into environmental monitoring and predictive maintenance. However, barriers such as uncertain return on investment (ROI), limited technical expertise, and concerns about data privacy and security may hinder its adoption.

5. While grants have played a crucial role in funding companies tackling marine technology challenges, **the sector faces a critical shortage of capital, especially in long-term investments**. Despite its rapid growth and significant contributions to sustainable marine development, the lack of adequate funding poses a major barrier to the sector's continued advancement and innovation.

A FOCUS ON THE FUTURE

COVE has conducted the Canadian Ocean Enterprise study and released a corresponding White Paper every two years since 2020. The intent of this work has always been to gather data and gain insights for future comparisons, both within Canada as well as across internationally comparable studies conducted in the United States and United Kingdom.

The 2020, 2022, and now 2024 data points are an important reference for the future as they illustrate a growing sector during turbulent macroeconomic times. Each of these three White Papers points to the health of the Ocean Enterprise cluster during one of the more impactful global inflection points of recent memory; from the start of the global pandemic to the tail end, and now with some distance and return to a new normalcy.

The insights gathered through these studies have been invaluable in tracking the sector's resilience and expansion. The findings continue to assist industry stakeholders, governments, academia and investors in understanding the dynamic landscape of Canada's Ocean Enterprise. COVE will maintain its dedication to capturing these key trends and publishing Canadian Ocean Enterprise White Papers to reflect the sector's continued success.

INTRODUCTION

The ocean economy is diverse. It represents many of the world's regions, ecosystems, and industries, and is widely ascribed as high-value. Yet it lacks an industry- or government-recognized definition in Canada. The purpose of this study is to continue the work of assessing the size and economic impact of Canada's Ocean Enterprise companies. The Ocean Enterprise is the business component of the Blue Economy, and is comprised of two main categories of companies: "Providers" and "Intermediaries". Ocean Enterprise activities include the companies providing technologies and value-added products and services related to the world's oceans, coasts, and tidal reach environments, and Canada's Great Lakes system. The study does not extend to end-users who derive societal or economic benefits and services.

The survey results demonstrate a growing trend for companies adopting the use of Artificial Intelligence (AI) for Data Analysis and Management, and Research and Development. Some Ocean Enterprise companies have adopted the technology, with many citing barriers such as uncertain returns on investment, limited technical expertise, and concerns about data privacy and security. There is a need for increased education and training around AI, and development of policy surrounding its use and application to increase adoption and further drive growth in the marine sector.

Outside of Venture Capital, grants have been a major source of funding for companies responding to marine technology challenges. Despite the sector's growth and its positive impact on sustainable marine development, there is a shortage of adequate capital, particularly long-term investment. This is due to marine technologies' extended development timeline requirements, which make them riskier compared to other industries. As Canada's Ocean Enterprise continues to expand and provide a foundation for sustainable marine innovation, it is essential to increase the availability of long-term capital to both preserve and advance innovative solutions in and around our ocean.

METHODOLOGY

This report is a collaborative effort between the Society for Underwater Technology (SUT) and the Maritime Technology Society (MTS), who have jointly contributed to defining the concept of 'Ocean Enterprise'. This definition and the methodology for this study have been used in international studies in the United Kingdom since 2009, and the United States since 2015. By using the same definitions and methodology, this research allows for comparisons across these tightly connected ocean economies.

BACKGROUND

The 2024 Canadian Ocean Enterprise White Paper builds on the 2022 report, aiming not only to update the previous findings but also to apply lessons learned, broaden the scope, and provide a foundation for international comparison. Secondary research has been incorporated to complement the study's insights and offer additional context.

The 2024 study began by reviewing the companies identified in the 2022 Ocean Enterprise Study that fit the definition of Providers and/or Intermediaries, and were still operational. The list was then expanded using ocean industry lists, company websites, and attendance at ocean-related events and conferences. Further expansion included adding other companies from ecosystem partners, hubs and clusters across Canada. Industry experts were consulted to identify any companies that were missing from the dataset, those that have ceased operations, those without a presence in Canada, and those that have rebranded or been acquired by other organizations. This step was taken to avoid duplication during outreach efforts.

The final 2024 list consisted of 209 companies that met the criteria, with 38 (or 18%) of these being COVE resident companies at the time the survey was conducted.

OUTREACH AND SURVEY ADMINISTRATION

The survey design closely mirrored the 2020 and 2022 Canadian Ocean Enterprise reports to allow for comparisons to be made. While the core questions remained largely the same, some answer choices were more extensive, allowing for a more detailed analysis that would provide better insights. Additionally, a few new questions were included this year to facilitate reasonable comparisons with similar studies conducted in the US and UK.

The survey was conducted from June 3 to July 19, 2024, with 112 responses recorded. Of these, 90 responses came from companies identifying as Providers and/or Intermediaries, representing a 43% response rate. To ensure company privacy, the survey data was aggregated and tabulated before analysis.

The methodology used in this report combined a survey of businesses in the Canadian Ocean Enterprise that identified as Providers and/or Intermediaries, with a secondary analysis using public information sources such as company websites and other industry-related web pages. The use of secondary data sources was necessary to address gaps in the survey responses and provided additional depth and breadth to enrich the overall analysis presented in this report.

DEFINITIONS

The Ocean Enterprise is defined as the companies that provide platforms, technology, and information services that deliver ocean observations, measurements, analyses and forecasts that enable operations in the sectors of our economy driven by sustainable, ocean resources. This high-tech sector acts as a force multiplier across the whole Blue Economy, impacting fisheries, aquaculture, shipbuilding, energy, transportation, tourism, ocean science and other industries.

This report uses language defined by The Canadian Ocean Enterprise 2020, which was based on the framework for Ocean Enterprise that was developed for the 2015 US Ocean Enterprise and codified in the 2020 US Ocean Enterprise study[2]. There are three principal components in the Ocean Enterprise according to this framework. For consistency, the same definitions provided in the 2020 US Ocean Enterprise study are used in this report:

- **Providers** deliver the technological means to undertake ocean observations and measurements.
- **Intermediaries** make use of ocean, coastal and lake measurements, observations, and models as inputs to create value-added information products in support of end-users.
- **End-Users** are public and private organizations that derive safety, economic or stewardship benefits from Blue Economy products and services.

[2]NOAA, 2021. The Ocean Enterprise 2015-2020: A study of U.S. Blue Economy business activities. https://cdn.ioos.noaa.gov/media/2021/12/OE-REPORT- 2015_2020-FINAL_120721_web.pdf

Providers manufacture sensors, instruments, and platforms; provide the data infrastructure that manages and communicates ocean data; and develop and maintain the data management systems, software tools, and models that are used to help turn ocean data into useful information. Examples include, but are not limited to, final and component products associated with monitoring buoys, satellite or air-based observation systems, underwater or surface observation systems and platforms, instruments for navigation and positioning, communication and reporting systems for observation data, and IT infrastructure.

Intermediaries combine, synthesize, or integrate ocean data to create a value-added data product or service. Examples include, but are not limited to, weather or surf forecast services, ocean temperature and current modelling, environmental hazards evaluation or research systems, coastal threat models, fisheries monitoring, and related activities.

End-Users utilize ocean data in products or services but are not an ocean data products or services company. End-users are generally the ultimate beneficiary of ocean observations, measurements, and models. Examples include, but are not limited to, operational end-users such as freight shipping, offshore oil and gas extraction, fishing fleet operation or charter boat services; science end-users such as academic research departments; policy end-users such as government regulators; or public end-users such as users of seasonal retail outlooks, and weather or surf websites and apps.

CHARACTERISTICS OF THE CANADIAN OCEAN ENTERPRISE

ORGANIZATION FUNCTION

Figure 1 categorizes respondents into Providers and Intermediaries for 2020, 2022 and 2024. A larger sample size of companies this year has led to results showing an increase in the relative percentage of Providers over Intermediaries. Perhaps more interestingly, the 2024 results show fewer companies identifying as providing both functions, suggesting a focusing of ocean companies on their key strengths.

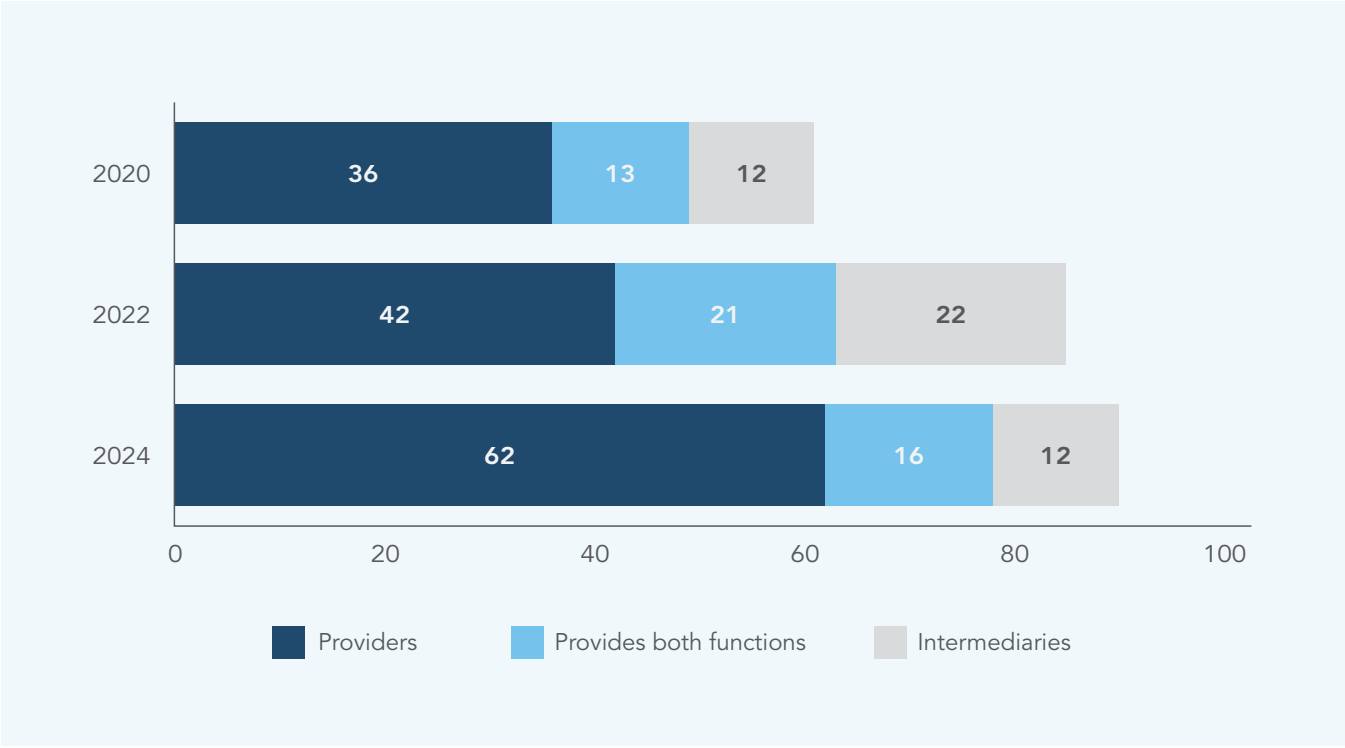


Figure 1: Business function of respondents

COMPANY SIZE AND EMPLOYMENT

In 2024, 87% of respondent companies are classified as small businesses with 100 or fewer employees, up from 71% in 2022. Furthermore, 99% of this year's respondents are small-medium enterprises (SMEs) with fewer than 500 employees, an increase from 94% in 2022. This distribution is more consistent with Innovation, Science, and Economic Development Canada's (ISED) data on Canadian businesses compared to the 2022 report[3]. Notably, 60% of companies now have 20 or fewer employees, a significant rise from 46% in 2022. Employment distribution has also shifted: in 2022, 18% of companies had over 250 employees, but this figure has fallen to just 1% in 2024, likely due to fewer responses from larger companies.

Seventy-three percent of responding companies project employment growth within the next 12 months, fairly similar to 75% of responding companies in 2022. On the other hand, none of the responding companies project a decline in employment, compared to 4% of respondents in 2022. From these responses, we expect to see increased employment growth in the next two to five years. Based on our estimates, **total employment within Canada's Ocean Enterprise is around 8,000 employees compared to the 6,000 in the 2020 study, representing a 33% growth**.

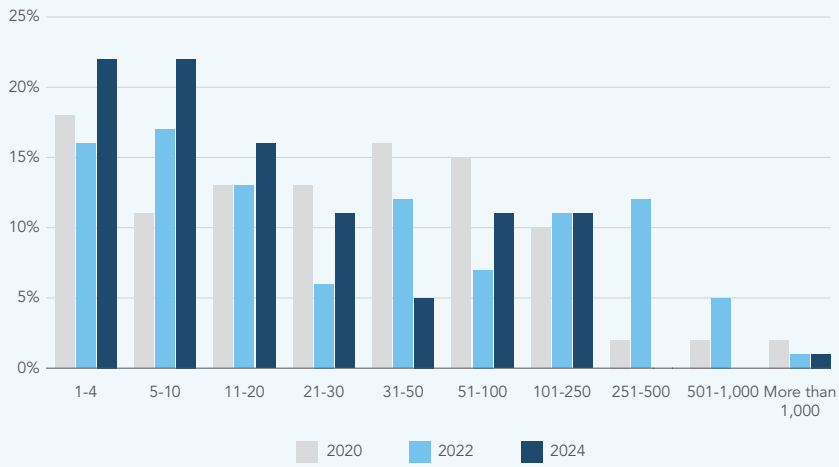


Figure 2: Business size of survey respondents

Intermediaries have reported to be smaller businesses which aligns with their work of adding value to data collected by Providers for End-Users.

- All responding Intermediaries are categorized as small businesses, with none employing more than 50 people.
- Over one-third of Intermediaries employed fewer than five employees.

[3]ISED. (2022). Key Small Business Statistics 2022. Key Small Business Statistics 2022 (canada.ca)

LOCATION DYNAMICS

This year's survey included a new question about the number of discrete locations from which companies operate within Canada. This information was not reported in the 2020 and 2022 studies, but will be useful for future comparisons with the US Ocean Enterprise Studies.

In 2024, 59% of responding companies indicated that their businesses operated from a single location in Canada while nearly one-third operate from two locations. **The increase of marine technology hubs, such as COVE, has led more companies to establish satellite offices across the country to complement activities of their primary headquarters**. This trend partially explains why some companies have multiple locations in Canada.

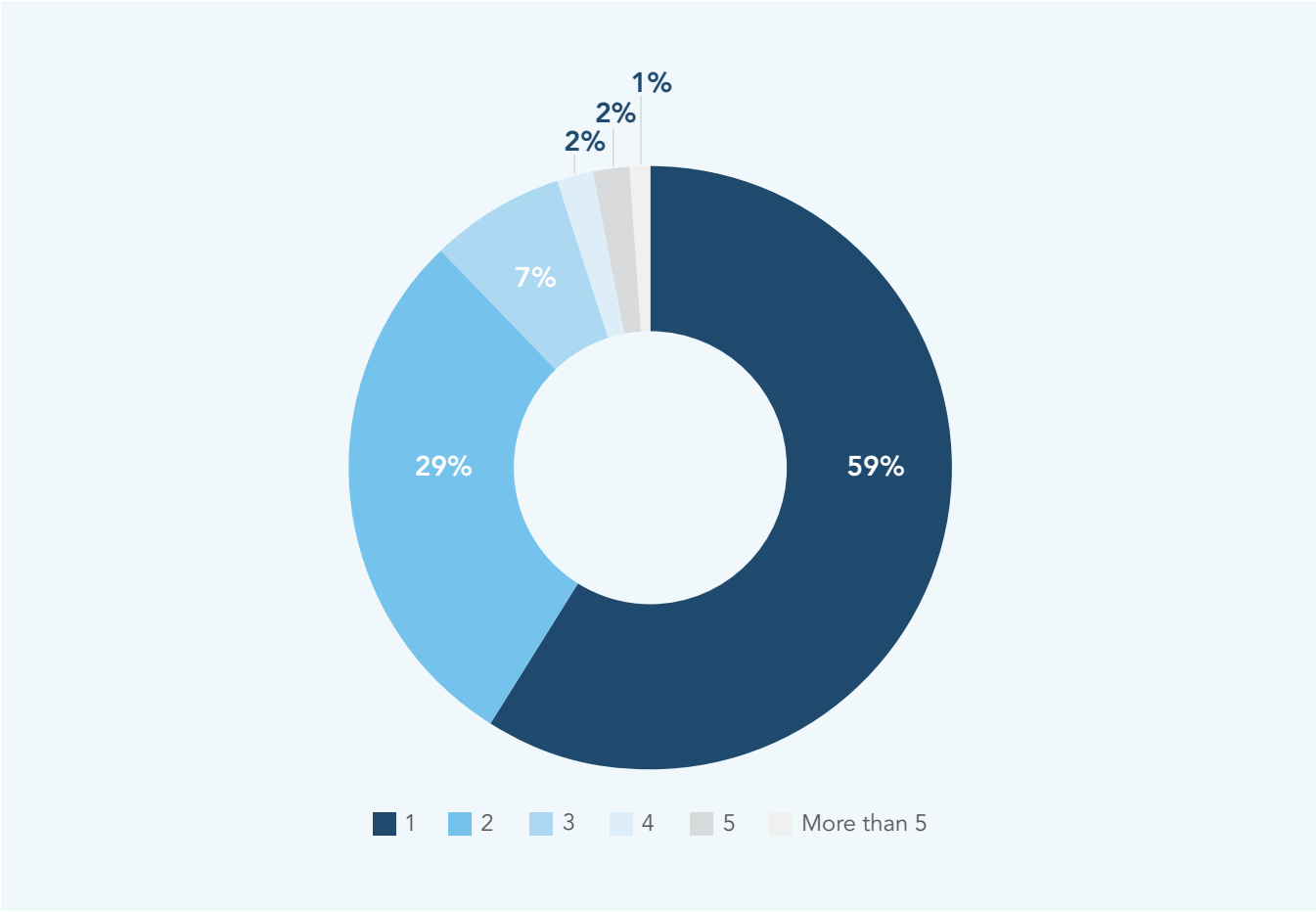


Figure 3: Number of discrete locations of survey respondents

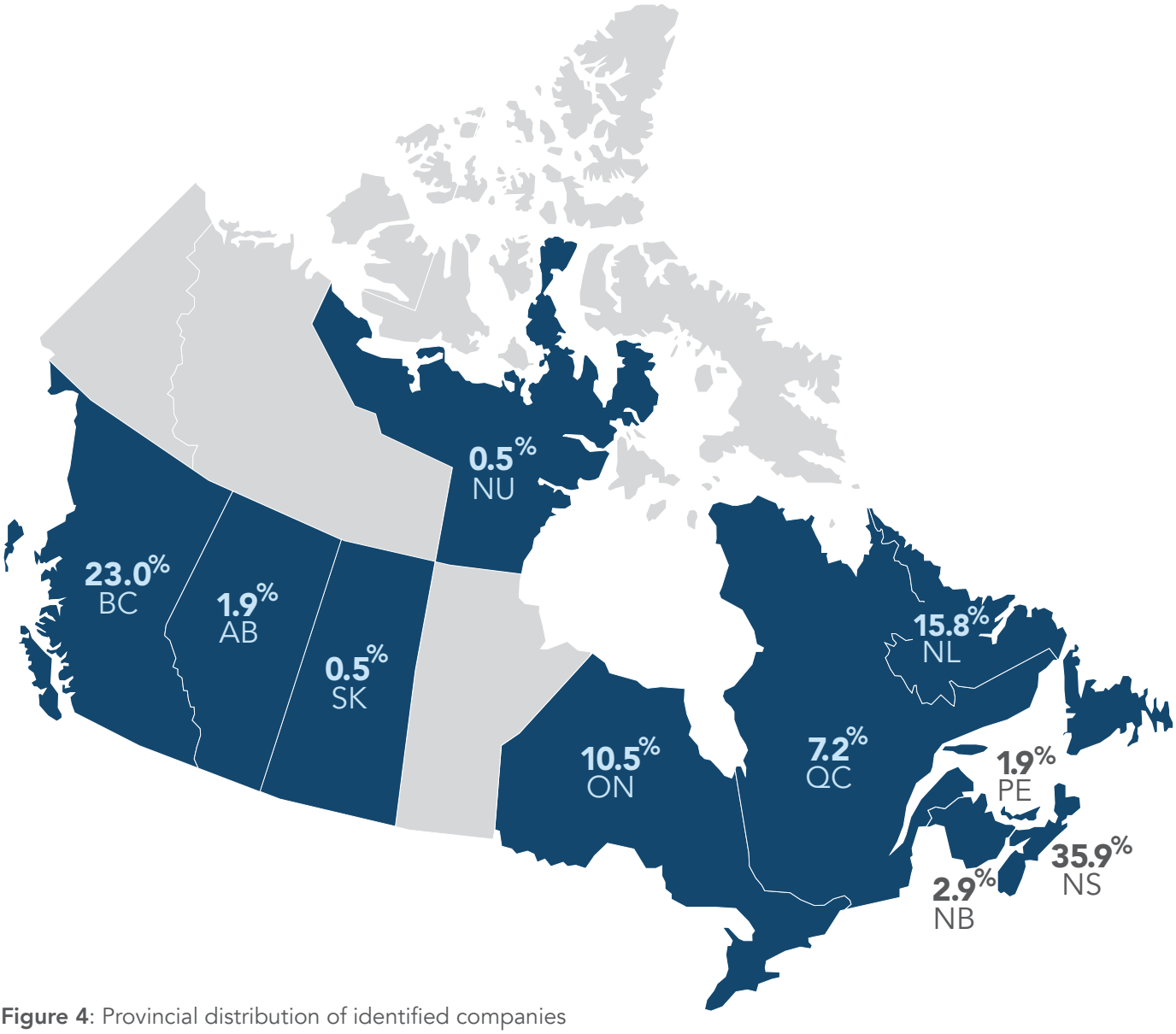


Figure 4: Provincial distribution of identified companies

COMPARATIVE GROWTH OF IDENTIFIED OCEAN ENTERPRISE BUSINESSES BY PROVINCE

All provinces with existing Ocean Enterprise entities, except for Alberta, have experienced growth in the number of Ocean Enterprise companies. Similar to the 2022 study, **Nova Scotia, British Columbia, and Newfoundland and Labrador continue to have the majority of identified companies**. Together, these provinces account for 75% of companies in Canada's Ocean Enterprise.

Although the absolute number of Ocean Enterprise companies in Atlantic Canada increased from 86 in 2022 to 118 in 2024—largely driven by growth in Nova Scotia—the overall concentration of these companies within the region remained fairly consistent at 54% in 2022 and 56% in 2024.

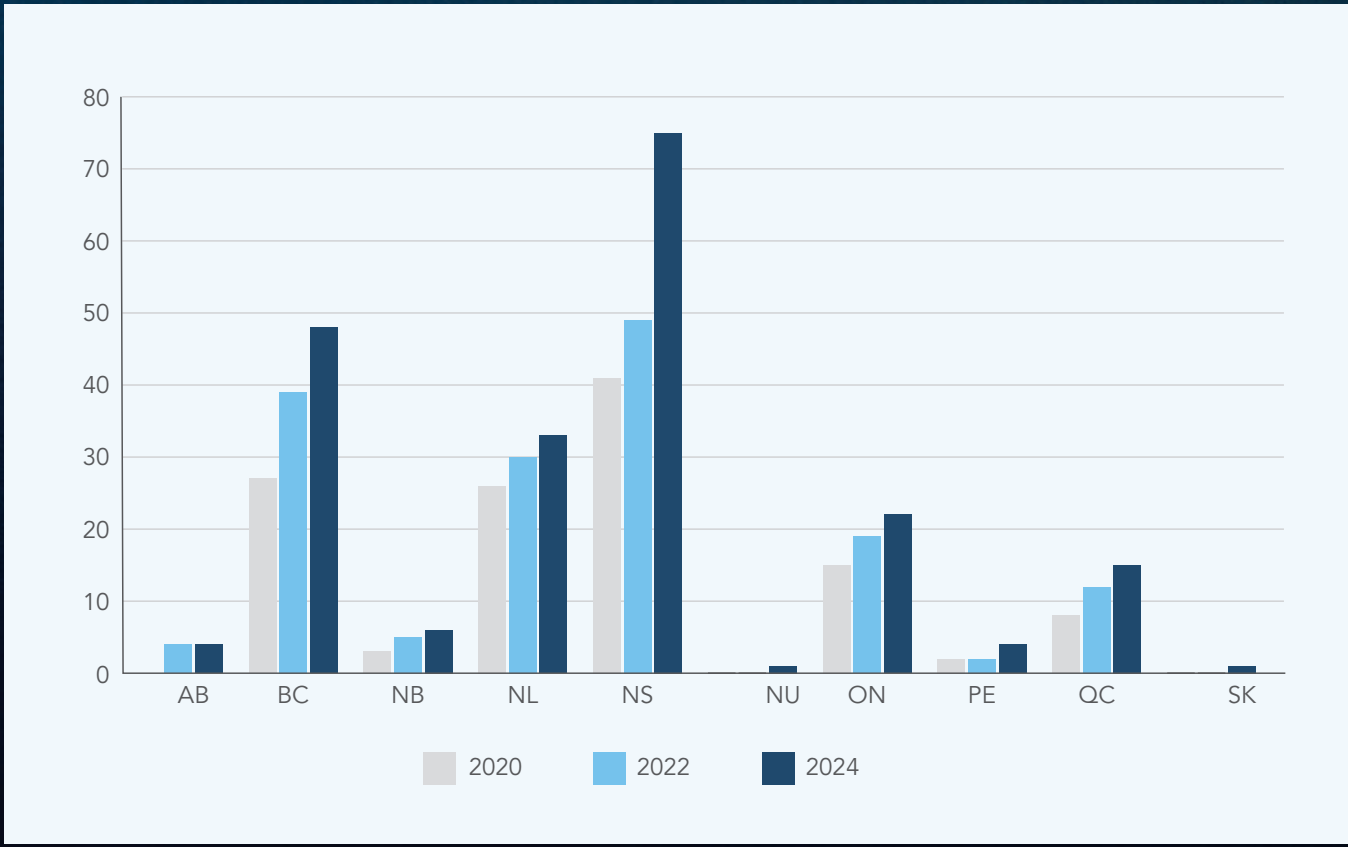


Figure 5: Comparative growth in provincial distribution of identified companies

TIME IN BUSINESS

In 2024, 55% of respondents reported having more than 10 years' experience in their Ocean Enterprise activities, a stark contrast to 21% in the 2022 study. However, the 2022 report indicated that companies that had been operating in the Ocean Enterprise for more than 10 years were underreported, as the 2020 report captured 63% of companies operating for more than 10 years in the Ocean Enterprise.

Notably, 80% of respondents have at least five years' experience in offering Ocean Enterprise activities. Close to a third of Intermediaries have been offering Ocean Enterprise activities for three years or less, three times more than the distribution for Providers, signalling that many new businesses are focused more on the value-added activities of the Ocean Enterprise.

Given the increased use and adoption of AI, there has been a growing number of start-ups and small-medium sized companies capitalising on the trend to deliver products and services around data analysis and software. With a $2.4 billion federal investment in programs expected to secure Canada's AI advantage[4] and continued investor interest in the technology, the use of AI and the formation of AI-focused companies is expected to increase.

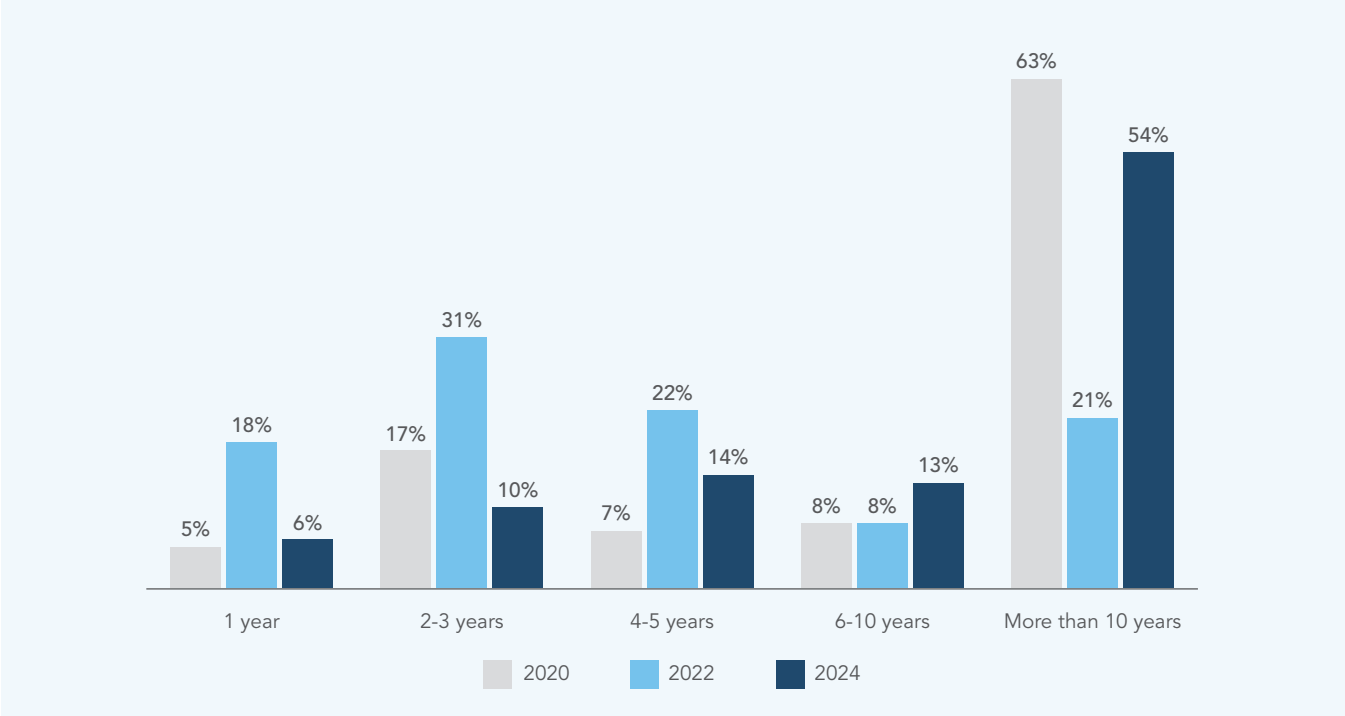


Figure 6: Organizational experience of respondents in the Ocean Enterprise

[4]Prime Minister of Canada (2024). Securing Canada's AI advantage. https://www.pm.gc.ca/en/news/news-releases/2024/04/07/securing-canadas-ai

REVENUE

For a more granular analysis, the revenue brackets were more expansive this year. One insight this more detailed breakdown revealed was that while 9% of companies reported revenues between $20M - $100M in 2022, of the 8% of companies in that range this year, 5% reported revenue between $20M - $50M, with the remaining 3% between $50M - $100M.

Similar to 2022, most companies reported revenue between the $1M and $5M range. While 75% of companies reported revenues of less than $5M in 2022, 33% reported revenues of less than $5M in 2024, a likely indication that more companies are gradually experiencing a growth in revenue beyond the $5M mark.

The distribution shift towards the larger revenue brackets was expected as 72% of respondents in the 2022 study anticipated an increase in revenue at the time of the study. The previous study had been completed as the pandemic was coming to a close and business was returning to normal. With increased inflation and climate change on the minds of many, demand for scientific knowledge and ocean research and understanding has continued to grow. It is anticipated that more companies will shift to larger revenue buckets, as 83% of respondents anticipate revenue growth over the next 12 months, further complemented by only 2% of the responding companies expecting a drop in revenue, compared to 4% in 2022.

Based on our estimates, **Canadian Ocean Enterprise revenue is between $1.8 billion and $ 2.0 billion**, compared to the $1.1 - $1.3 billion in 2020, and this figure is increasing steadily.

When viewed at a business function level, the following are the key insights:

- None of the responding Intermediaries generated revenue greater than $20M while 16% of Providers generated more than $20M revenue.
- Like the overall revenue distribution, close to a third of both company types generates revenue between $1M - $5M.

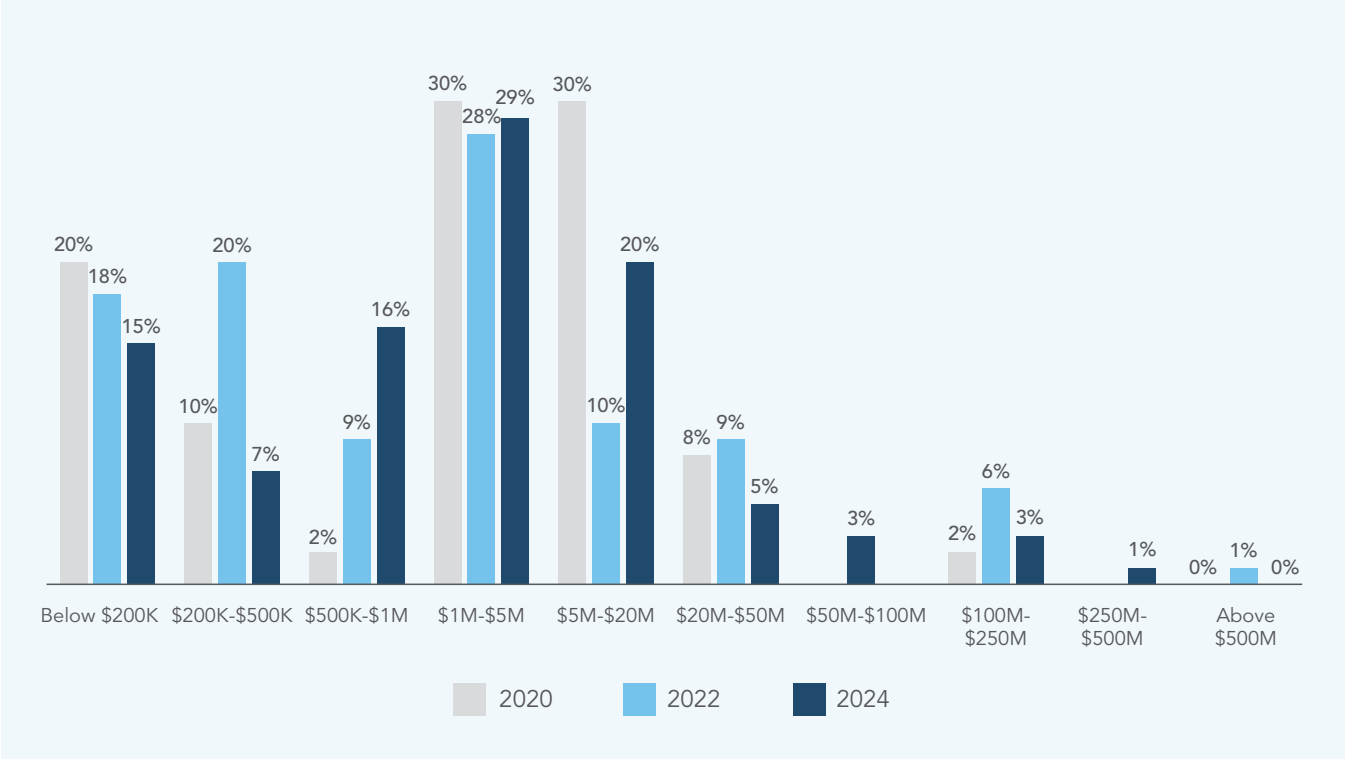


Figure 7: Revenue distribution of respondents

Half of the companies with revenues below $200k have been in operation for two years or less. A trend is emerging where smaller companies are generating higher revenues, especially in the $5M to $20M range, where the number of companies has more than doubled since 2022.

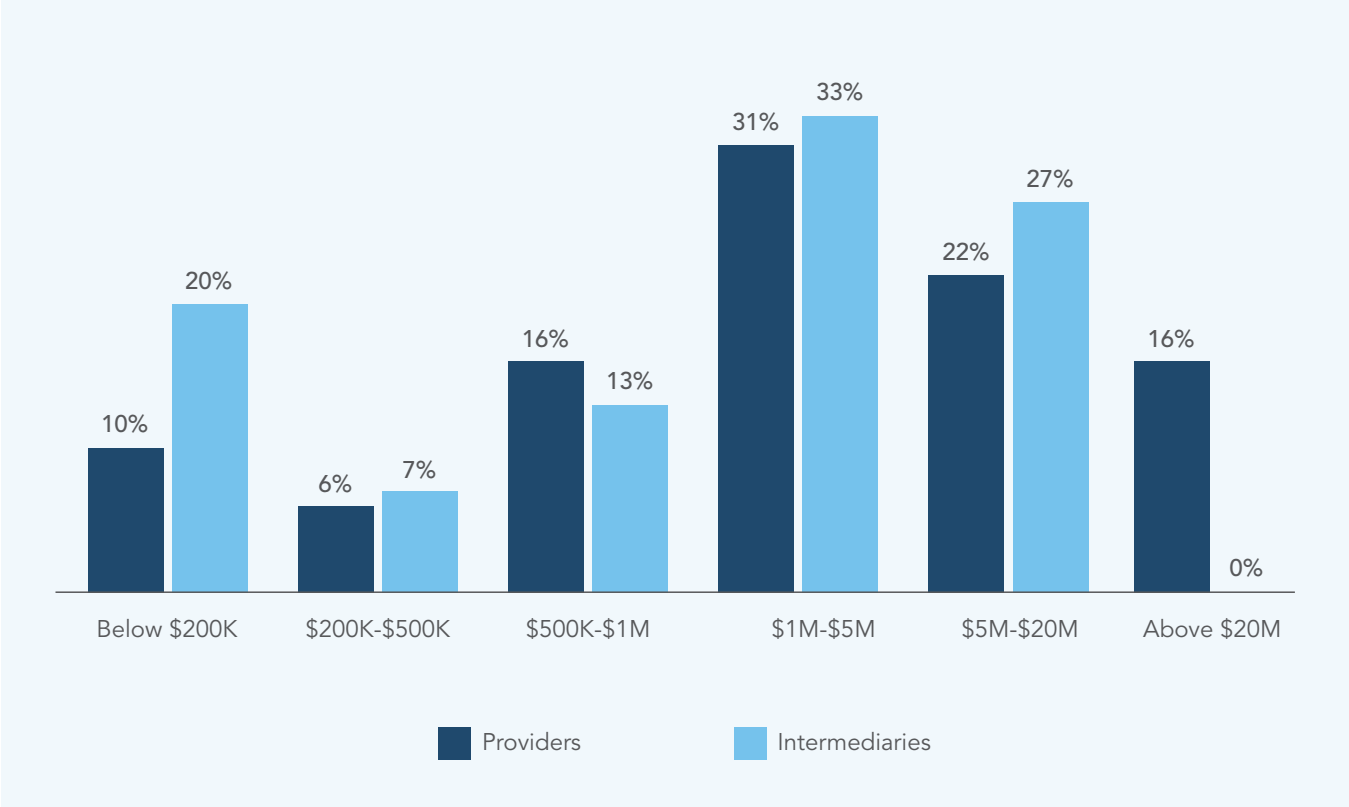
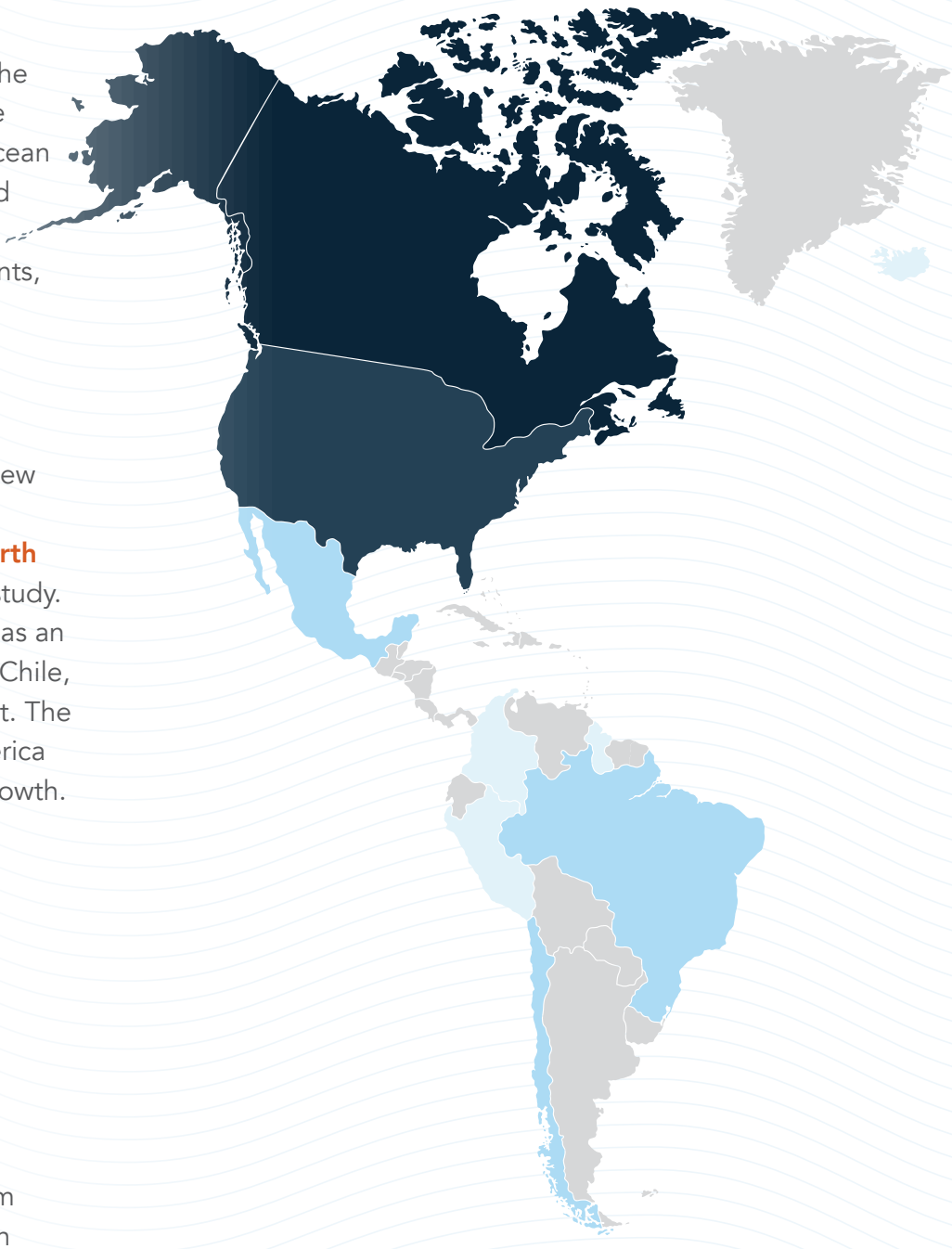


Figure 8: Revenue distribution comparison of respondents between Providers and Intermediaries

There is an increased optimism for revenue growth in the next 12 months. Eighty-three percent of companies expect their revenues to increase within the next 12 months, an increased optimism compared with 72% in 2022, a further indication of Canada's growing Ocean Enterprise. While 4% of companies in 2022 expected a revenue decline, none of the companies expect a revenue decline this year.

KEY MARKETS

In North America, Canada and the United States continue to be the leading markets for Canada's Ocean Enterprise. In Europe, the United Kingdom stands out as the top export market among respondents, followed by Norway, France, and Germany, which are regarded as equally important.



Within Oceania, Australia and New Zealand remain influential **with Australia coming up as the fourth most important market** in the study. South America is also identified as an area of interest, with Brazil, and Chile, identified as key areas of interest. The extensive coastline of Latin America offers significant potential for growth.

In Asia, Japan, the United Arab Emirates, and Singapore are highlighted as major markets. In Africa, 17% of respondents recognized Nigeria as a primary market with Ghana, Angola and Egypt following.

Future reports could benefit from analyzing the specific activities in different global regions to better understand why certain markets are more attractive to Canadian Ocean Enterprise companies focused on exports.

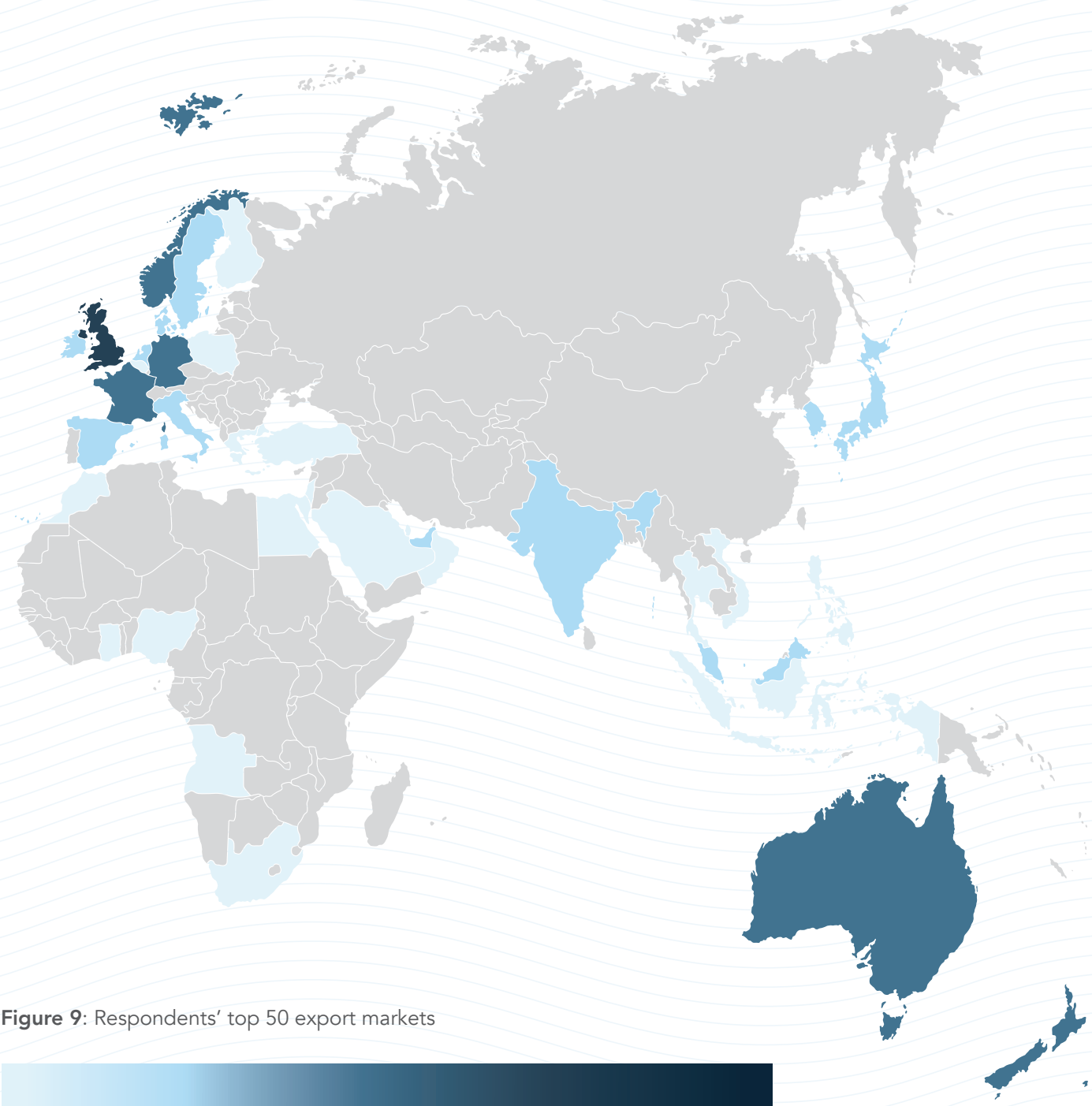


Figure 9: Respondents' top 50 export markets

6%

91%

CUSTOMER MARKETS

The 2024 report introduces a new analysis of customer market sectors for Ocean Enterprise products and services, which was not covered in the 2020 and 2022 studies. This addition will facilitate international comparisons, aligning with data captured in the 2020 US study.

Overall, the key market sectors are quite diverse. Over half of respondents cited six customer segments as key:

- Academic Research (67%)
- Defence (62%)
- Coastal Protection (54%)
- Government Research (53%)
- Marine & Maritime Security (52%)
- Ports and Harbours (50%)

Public sector customers are notably represented among the key segments, with Defence (62%), Marine & Maritime Security (52%), Government Research (53%), Ports & Harbours (50%) being prominent.

Academic Research emerged as the most important customer sector for two-thirds of the survey respondents. This mirrors the 2020 US Study, which also identified Academic Research as the leading sector (77%).

Customer Sectors by Province
(top three provinces based on concentration of companies identified)

NOVA SCOTIA

1. Academic Research (68%)
2. Defence (62%)
3. Fishing (54%)
4. Ports & Harbours (49%)
5. Aquaculture (49%)
6. Coastal Protection (49%)

BRITISH COLUMBIA

1. Academic Research (75%)
2. Ecosystem Monitoring (70%)
3. Government Research (65%) and Defence (65%)
4. Coastal Protection (60%) and Marine & Maritime Security (60%)

NEWFOUNDLAND & LABRADOR

1. Defence (60%), Oil & Gas (60%) and Government Research (60%)
2. Academic Research (50%), Marine & Maritime Security (50%) and Wind Energy (50%)

Figure 10 shows the key market sectors for Canada's Ocean Enterprise highlighted by survey respondents.

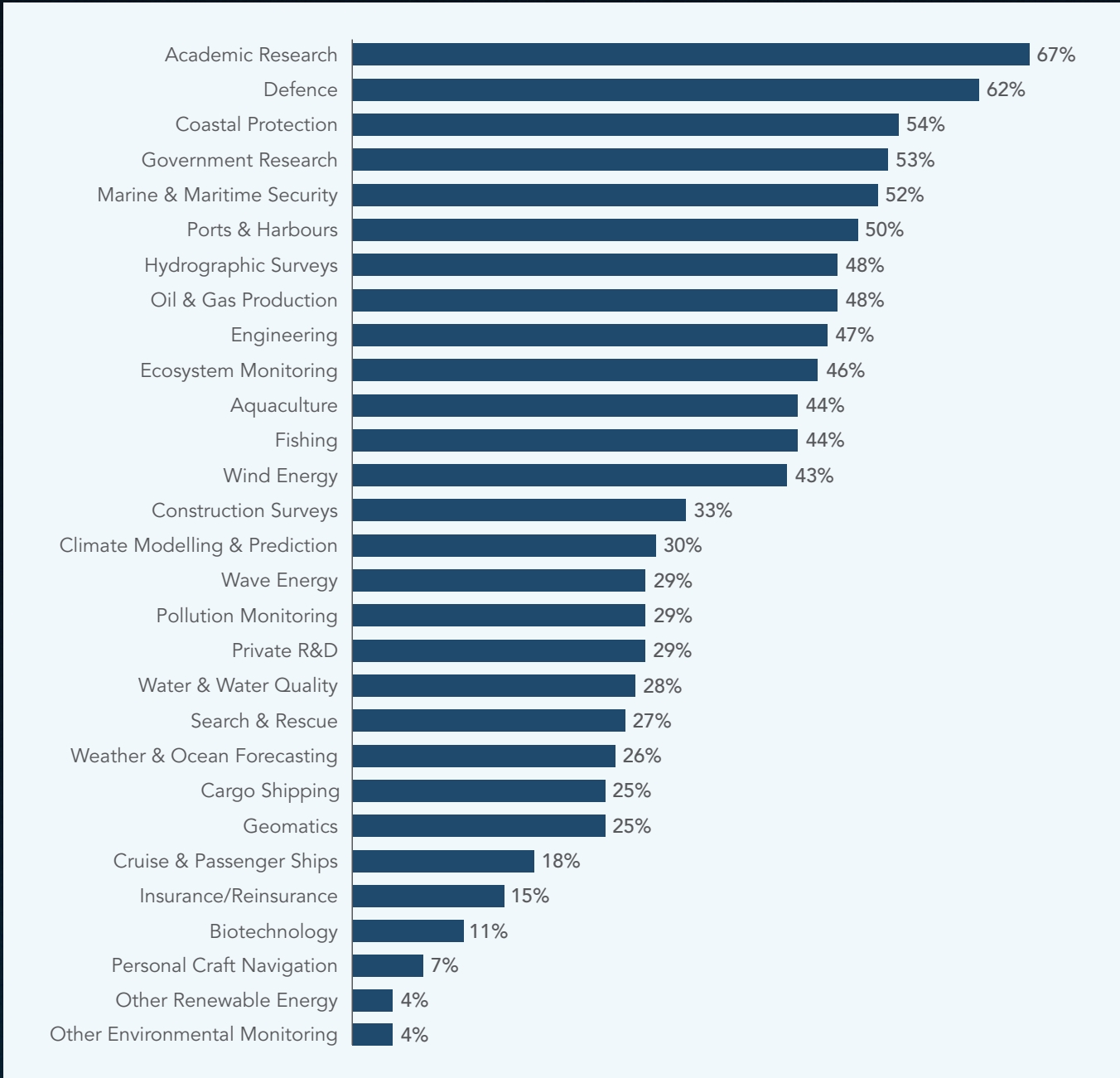


Figure 10: Important customer markets of survey respondents

INDUSTRY TRENDS

Below are the results from the optional survey questions around the use of AI and knowledge of Venture Capital to gain more insights. 58% of respondents opted to complete the Artificial Intelligence and Venture Capital questions.

ARTIFICIAL INTELLIGENCE

69% of respondents to this optional section of the survey intend to utilize AI in the next 24 months

Data Analysis & Management Use of AI for big data processing, predictive analytics, and data visualization and research and development.

Research & Development Enhancing innovation processes, speeding up experimental procedures, and product development.

In the next 24 months, AI use will increase significantly in different areas of operations compared to utilization now.

For companies who do not use AI, the biggest barriers to adoption are:

- Uncertain return on investment (60%)
- Lack of technical expertise (33%)
- Data privacy & security concerns (33%)

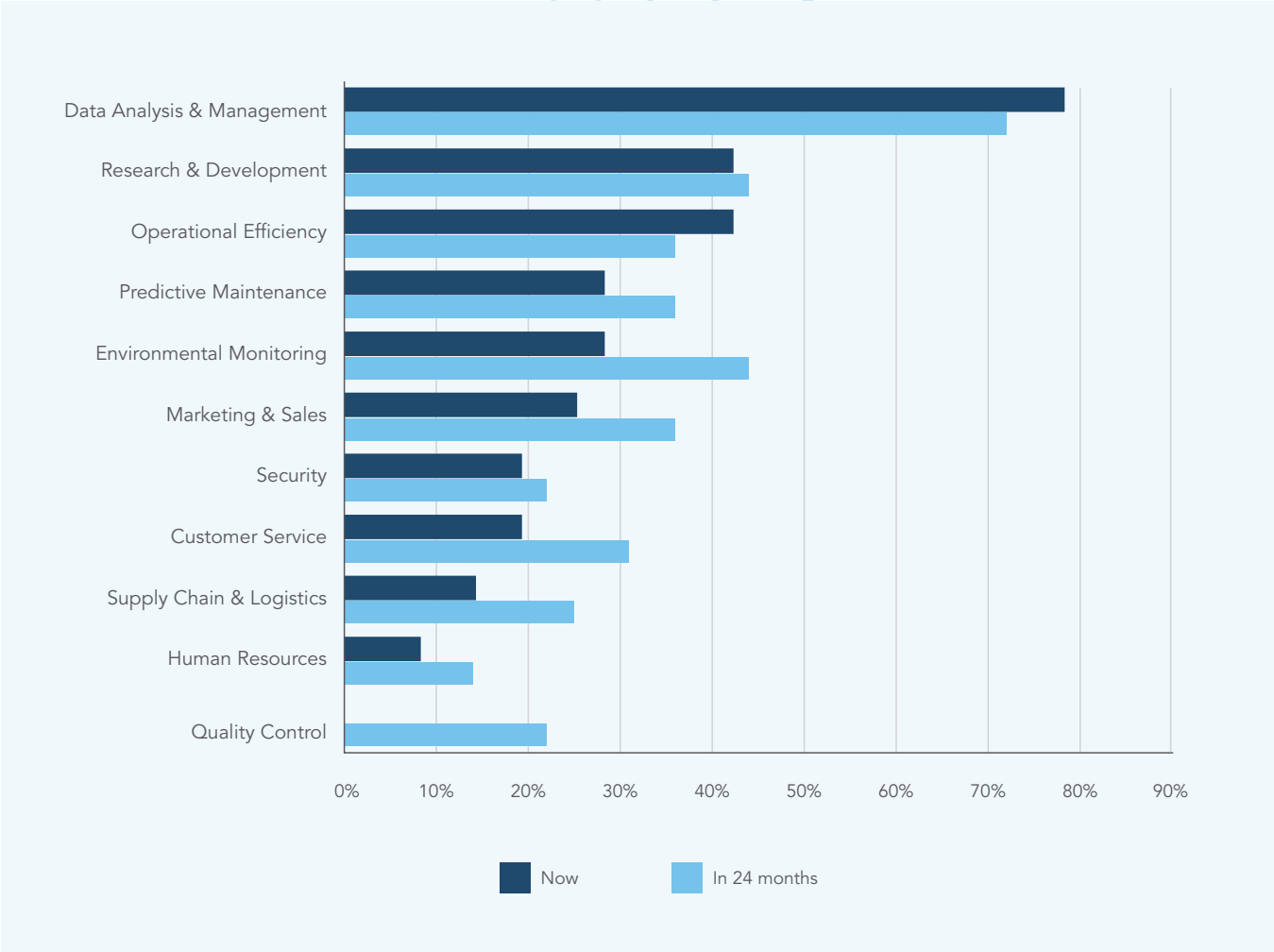


Figure 11: How AI is being utilized by respondents now vs in the next 24 months

VENTURE CAPITAL LANDSCAPE

51% of respondents have an intermediate understanding of Venture Capital

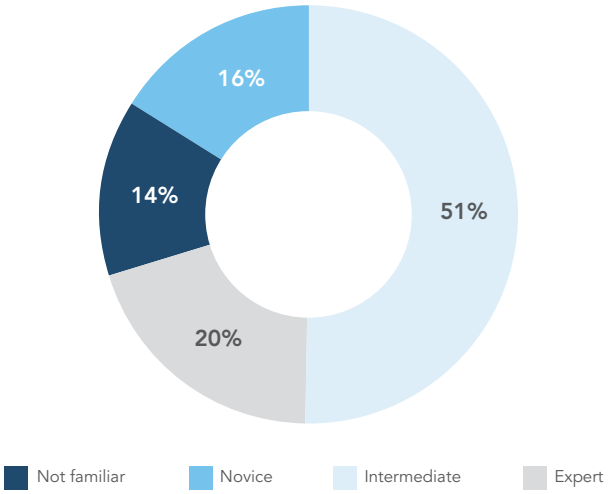


Figure 12: Respondents' knowledge of Venture Capital

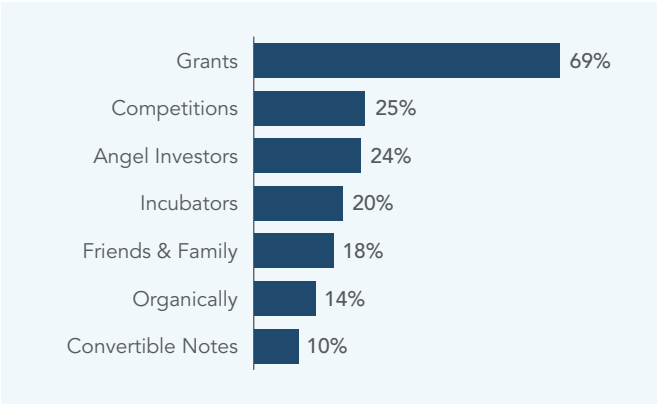


Figure 13: Respondents' funding vehicles outside of Venture Capital

The top reason for seeking Venture Capital financing is for market expansion.

Grants from government agencies, non-profit organizations, or private foundations that support businesses or specific industries are the most common way respondents have been funded outside of Venture Capital.

Two main challenges respondents perceive in accessing Venture Capital funding are:

- High expectations from VCs (41%)
- The loss of decision-making control (35%)

The maritime sector struggles with attracting Venture Capital. Typically long development cycles and high capital cost do not align well with the needs of Venture Capital investors. The Venture Capital market as a whole has seen a decline in the number of investments over the past year as interest rates have risen and cash has become expensive. The marine sector has not been exempt from this decline and a concerted effort to attract this type of financing to the sector will benefit companies looking to scale.

CONCLUSION

The findings of the study demonstrate the sector's dynamism and growth with over 8,000 people employed and revenues estimated between $1.8 billion and $2.0 billion. Furthermore, findings reveal a 31% increase in the number of Ocean Enterprise companies identified since 2022, with noteworthy growth in the number of companies in Nova Scotia and the identification of previously unidentified companies in Saskatchewan and Nunavut.

Canada's Ocean Enterprise is increasingly adopting advanced technologies such as AI, and sustainable solutions to meet market demands. This shift is expected to enhance operational efficiency and align with the increased focus on environmental sustainability. Several companies have employed diverse and innovative financing strategies to overcome some of the early-stage challenges of high-tech start-ups, reflecting a robust approach to capital acquisition and investment strategies.

It is anticipated that the future of the Canadian Ocean Enterprise will be shaped by regulatory changes and an increased focus on sustainability. Companies that are agile, and attentive to these developments, and invest in cutting-edge technologies will be better positioned for long-term success. Offering services in emerging markets and regions could also enhance the growth of the sector. There needs to be an intentional focus on workforce development in the sector to provide a pipeline of qualified and suitable professionals to address the current expertise gaps in order to drive innovation in the future.

Looking ahead, supplemental research incorporating official Canadian statistical databases is anticipated as a supplementary resource in future reports for metrics such as overall revenue and employment associated with the Ocean Enterprise to most accurately quantify growth.

Continuous monitoring of these trends is crucial in guiding future strategies and research. Stakeholders are encouraged to engage in future research efforts to gain a comprehensive understanding of emerging trends and opportunities to support the sector's innovation and progress.

INDUSTRY PERSPECTIVES

For the first time, the 2024 Canadian Ocean Enterprise White Paper includes an industry perspective section highlighting four companies driving innovation in Canada's ocean sector. The industry perspectives showcase some of the cutting-edge technology by developed companies in Canada to offer insights into some of the latest advancements as well as to highlight success stories to inspire not only other companies, but the general ecosystem. The perspectives also highlight the environmental and social impact of these companies. The four companies highlighted in the industry perspectives are primarily located in British Columbia and Nova Scotia.

3D WAVE DESIGN

3dwavedesign.com

Founded: 2019

Primary location: Mahone Bay, Nova Scotia

3D Wave Design is an Indigenous-owned company that specializes in creating interactive 3D climate models to aid in environmental and infrastructure risk management.

FACTORS ENABLING GROWTH:

Pandemic Adaptation: Unlike many companies, 3D Wave Design thrived during COVID-19 by leveraging remote meetings and flexible contract workers for efficient resource management.

Customer-Driven Approach: The company proactively develops business plans, tests ideas with users, gathers feedback, and refines products until they are fully accepted. The company excels at identifying problems and creating tailored solutions.

Scientific Reports: 3D Wave Design gained traction by using scientific reports, like Intergovernmental Panel on Climate Change (IPCC) sea level rise data, to demonstrate outcomes with 3D models, making their solutions more credible and appealing.

Societal Change: Increased societal focus on inclusion and climate change has also supported growth.

FACTORS HINDERING GROWTH:

Limited Customer Base: 3D Wave Design mainly targets governments, which is challenging due to bureaucratic layers, slow market education, and the complexity of selling innovative technology to multiple decision-makers within government structures.

INDUSTRY SHIFTS EXPECTED:

AI Integration: AI will enhance data analysis, particularly in the blue and green economies, and support research and development. It will also influence job roles, pushing companies to innovate and stay customer-driven to remain relevant.

OPENOCEAN ROBOTICS

openoceanrobotics.com

Founded: 2018

Primary location: Victoria, British Columbia

Open Ocean Robotics provides safe, affordable, and sustainable ocean monitoring solutions to digitize planet ocean and sustainably grow the $2.5 trillion blue economy.

FACTORS ENABLING GROWTH:

Innovative Financing: Open Ocean Robotics used a mix of investment capital, grants, customer revenue, and debt financing to overcome capital barriers.

Global Talent Acquisition: The company expanded its search beyond Canada to find experienced autonomous vehicle leaders, building a strong team to scale growth.

Customer Focus: By addressing customer demands for data, the company evolved from just an autonomous vehicle provider to an ocean data company.

Strategic Partnerships: Expansion to Halifax, Nova Scotia, leveraged COVE's network for talent and commercialization opportunities in the Atlantic region.

Market Interest: Secured commercial opportunities, including Defense Innovation Unit and Task Force 59, global non-profit WildAid for illegal fishing enforcement, and National Oceanic and Atmospheric Administration (NOAA) Indefinite Delivery, Indefinite Quantity (IDIQ) contracts, reflecting growing demand for ocean-related solutions.

FACTORS HINDERING GROWTH:

Access to Capital: Early-stage capital was challenging due to the significant investment needed for advancing core technology reliant on robust hardware.

Access to Talent: Finding senior leadership with experience in the emerging autonomous vehicle industry is difficult.

INDUSTRY SHIFTS EXPECTED:

Regulatory Changes: As the industry matures, more certainty and consistency in the regulatory environment will simplify global operations.

Technological Advancements: AI, machine learning, and improved satellite communications will enhance ocean data collection and analysis.

Broader Autonomous Vehicle Applications: With increased use of autonomous technologies in operational environments demonstrating strong value proposition, there will be expanded applications for which they are broadly adopted, including marine mammal protection, security, and environmental monitoring.

MARINE THINKING

marinethinking.com

Founded: 2018

Primary location: Halifax, Nova Scotia

Marine Thinking is an autonomous technology company empowering crewed and uncrewed surface vessels (USV) with autonomous performance capabilities, creating new possibilities and opportunities for a wide variety of marine applications.

FACTORS ENABLING GROWTH:

Support from Tech Hubs: Marine Thinking has benefited from resources and strategic partnerships through marine tech hubs like COVE driving its growth.

Government Funding: Past government funding has been crucial in developing the company's core technology.

Financial Backing: Marine Thinking has secured over $4M in non-dilutive funding and $10M in equity funding, both of which have been instrumental in driving the company's growth.

AI-Driven Innovation: Marine Thinking's focus on in-house AI for object detection and avoidance has established it as a leader in autonomous vessel technology, essential for long-term growth.

FACTORS HINDERING GROWTH:

Access to Talent: The company struggles to recruit experienced professionals in the specialized fields of autonomous vessels and AI.

Regulatory Environment: The marine autonomous surface ships (MASS) industry is in its early stages, with regulations and market education lagging behind the demand for autonomous technologies.

INDUSTRY SHIFTS EXPECTED:

Regulatory Developments: As the industry matures, more robust regulations will emerge, making global operations easier for companies like Marine Thinking.

Advancements in AI and Autonomous Vessels: Ongoing AI and machine learning advancements will enhance autonomous vessel capabilities, leading to more efficient maritime operations.

CELLULA ROBOTICS

cellula.com

Founded: 2001

Primary location: Burnaby, British Columbia

Other locations: Nova Scotia, USA, UK

Cellula Robotics Ltd. is a privately owned Canadian company and a global leader in marine technology, specializing in transforming underwater security with its advanced Autonomous Underwater Vehicle (AUV) systems.

FACTORS ENABLING GROWTH:

Wider Acceptance of Autonomous Underwater Vehicles (AUVs): There has been a wider acceptance of AUVs in the commercial and defence sectors enabling the company's growth.

Specialized Niche: Modular, persistent and long endurance capabilities for cruising AUVs combined with other robotic systems such as hovering underwater inspection robots to augment the total system capability.

FACTORS HINDERING GROWTH:

Operational and Technical Challenges: Balancing technical feasibility with operational viability remains difficult in a conservative industry. Economic and geopolitical factors can both support and hinder growth. Energy constraints and the need to lower the qualification level required for optimal system performance present significant technical challenges.

Need for Automation and Efficiency: The industry requires greater adoption of automated tools for mission planning, predictive maintenance, and post-mission analysis. Reducing the time needed to gather data and produce actionable reports, as well as minimizing the need for onboard personnel, are critical to overcoming growth barriers.

INDUSTRY SHIFTS EXPECTED:

Greater Adoption of AUV Technology: The increased adoption of AUV technology across market segments is expected to continue, especially with a focus on greener, more sustainable energy sources.

Machine Learning: Although ML is already in use for in-mission data processing and complex mission-based autonomy, it could be further accelerated and be used for more in-mission system health and predictive mission performance and graceful degradation along with the ability to truncate the data workflow resulting is faster access to actionable information.

COVE

coveocean.com