Analyzing Usage of Generative AI in Canada 2023

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- Dataset collection
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Objectives

Objective 1: What are the top 5 business sectors in Canada that use generative AI?

Objective 2: Which are the top 5 provinces in Canada using generative AI?

Objective 3: Do larger companies use generative AI more than small to medium-sized ones?

Objective 4: How much value is created created by using generative AI in top 5 business sectors ? Will generative AI replace jobs by reducing employment?

Objective 5: What are the top 5 business sectors in Canada that don't plan to use generative AI, even though it could help them save costs?

Dataset collection

Data Set 1: Types of businesses using Generative AI, whether they're using it, planning to use it, or haven't thought about it yet.

REF_DATE	GEO	DGUID	Business characteristics	Business's use of Generative AI	UOM	UOM_ID	SCALAR_FACTOR	SCALAR_ID	VECTOR	COORDINATE	VALUE	STATUS	SYMBOL	TERMINATED	DECIMALS
2023	Canada	2021A00	North American Industry Classification System (NAICS),	Already using Generative AI	Percent	239	units	0	v157974539	1.1.1	9.3	A			1
2023	Canada	2021A00	North American Industry Classification System (NAICS),	Have plans to use Generative AI	Percent	239	units	0	v157974539	1.1.2	4.6	A			1
2023	Canada	2021A00	North American Industry Classification System (NAICS),	Considered using but have no current plans t	Percent	239	units	0	v157974539	1.1.3	13.4	A			1
2023	Canada	2021A00	North American Industry Classification System (NAICS),	Have not considered using Generative AI	Percent	239	units	0	v157974539	1.1.4	72.7	A			1
2023	Canada	2021A00	Agriculture, forestry, fishing and hunting [11]	Already using Generative AI	Percent	239	units	0	v157974543	1.2.1	5.5	A			1
2023	Canada	2021A00	Agriculture, forestry, fishing and hunting [11]	Have plans to use Generative AI	Percent	239	units	0	v157974544	1.2.2	2.8	A			1
2023	Canada	2021A00	Agriculture, forestry, fishing and hunting [11]	Considered using but have no current plans t	Percent	239	units	0	v157974544	1.2.3	6.6	A			1
2023	Canada	2021A00	Agriculture, forestry, fishing and hunting [11]	Have not considered using Generative AI	Percent	239	units	0	v157974544	1.2.4	85.1	A			1
2023	Canada	2021A00	Mining, quarrying, and oil and gas extraction [21]	Already using Generative AI	Percent	239	units	0	v157974548	1.3.1	7.3	A			1
2023	Canada	2021A00	Mining, quarrying, and oil and gas extraction [21]	Have plans to use Generative AI	Percent	239	units	0	v157974548	1.3.2	1.4	A			1
2023	Canada	2021A00	Mining, quarrying, and oil and gas extraction [21]	Considered using but have no current plans t	Percent	239	units	0	v157974548	1.3.3	15.1	B			1
2023	Canada	2021A00	Mining, quarrying, and oil and gas extraction [21]	Have not considered using Generative AI	Percent	239	units	0	v157974548	1.3.4	76.2	B			1
2023	Canada	2021A00	Construction [23]	Already using Generative AI	Percent	239	units	0	v157974552	1.4.1	5.5	A			1
2023	Canada	2021A00	Construction [23]	Have plans to use Generative AI	Percent	239	units	0	v157974552	1.4.2	1	A			1
2023	Canada	2021A00	Construction [23]	Considered using but have no current plans t	Percent	239	units	0	v157974552	1.4.3	7.9	A			1
2023	Canada	2021A00	Construction [23]	Have not considered using Generative AI	Percent	239	units	0	v157974553	1.4.4	85.6	B			1
2023	Canada	2021A00	Manufacturing [31-33]	Already using Generative AI	Percent	239	units	0	v157974557	1.5.1	10.6	B			1
2023	Canada	2021A00	Manufacturing [31-33]	Have plans to use Generative AI	Percent	239	units	0	v157974557	1.5.2	4.8	A			1
2023	Canada	2021A00	Manufacturing [31-33]	Considered using but have no current plans t	Percent	239	units	0	v157974557	1.5.3	16.2	B			1
2023	Canada	2021A00	Manufacturing [31-33]	Have not considered using Generative AI	Percent	239	units	0	v157974557	1.5.4	68.4	B			1
2023	Canada	2021A00	Wholesale trade [41]	Already using Generative AI	Percent	239	units	0	v157974561	1.6.1	3.8	A			1
2023	Canada	2021A00	Wholesale trade [41]	Have plans to use Generative AI	Percent	239	units	0	v157974561	1.6.2	8.8	A			1
2023	Canada	2021A00	Wholesale trade [41]	Considered using but have no current plans t	Percent	239	units	0	v157974561	1.6.3	18.2	B			1

No of column headers: 16
No of rows: 3753
Primary key: COORDINATE

Dataset collection

Data Set 2: Industries using Generative AI and the benefits it brings them in different areas.

REF_DATE	GEO	DGUID	Business characteristics	Value or potential value created by Generative AI	UOM	UOM_ID	SCALAR_FACTOR	SCALAR_ID	VECTOR	COORDINATE	VALUE	STATUS	SYMBOL	TERMINATED	DECIMALS
2023	Canada	2021A000	North American Industry Classification System (NAICS), all industries	Accelerate development of creative content	Percent	239	units		0	v157974914	1.1.1	68.5	B			1
2023	Canada	2021A000	North American Industry Classification System (NAICS), all industries	Increase automation in tasks, without reducing employment	Percent	239	units		0	v157974914	1.1.2	46.1	B			1
2023	Canada	2021A000	North American Industry Classification System (NAICS), all industries	Automate tasks to replace employees	Percent	239	units		0	v157974914	1.1.3	12.8	A			1
2023	Canada	2021A000	North American Industry Classification System (NAICS), all industries	Achieve cost efficiencies	Percent	239	units		0	v157974915	1.1.4	35.1	B			1
2023	Canada	2021A000	North American Industry Classification System (NAICS), all industries	Improve client or customer experience	Percent	239	units		0	v157974915	1.1.5	37.5	B			1
2023	Canada	2021A000	North American Industry Classification System (NAICS), all industries	Drive data-driven decision making	Percent	239	units		0	v157974915	1.1.6	29.5	B			1
2023	Canada	2021A000	North American Industry Classification System (NAICS), all industries	Minimize workforce recruitment and retention challenges	Percent	239	units		0	v157974915	1.1.7	10.1	A			1
2023	Canada	2021A000	North American Industry Classification System (NAICS), all industries	Value or potential value created by Generative AI, other	Percent	239	units		0	v157974915	1.1.8	3.7	A			1
2023	Canada	2021A000	Agriculture, forestry, fishing and hunting [11]	Accelerate development of creative content	Percent	239	units		0	v157974923	1.2.1	34.8	D			1
2023	Canada	2021A000	Agriculture, forestry, fishing and hunting [11]	Increase automation in tasks, without reducing employment	Percent	239	units		0	v157974923	1.2.2	52.1	E			1
2023	Canada	2021A000	Agriculture, forestry, fishing and hunting [11]	Automate tasks to replace employees	Percent	239	units		0	v157974923	1.2.3	24.9	D			1
2023	Canada	2021A000	Agriculture, forestry, fishing and hunting [11]	Achieve cost efficiencies	Percent	239	units		0	v157974923	1.2.4	46.6	E			1
2023	Canada	2021A000	Agriculture, forestry, fishing and hunting [11]	Improve client or customer experience	Percent	239	units		0	v157974923	1.2.5	33.2	D			1
2023	Canada	2021A000	Agriculture, forestry, fishing and hunting [11]	Drive data-driven decision making	Percent	239	units		0	v157974924	1.2.6	46.3	D			1
2023	Canada	2021A000	Agriculture, forestry, fishing and hunting [11]	Minimize workforce recruitment and retention challenges	Percent	239	units		0	v157974924	1.2.7	13.9	C			1
2023	Canada	2021A000	Agriculture, forestry, fishing and hunting [11]	Value or potential value created by Generative AI, other	Percent	239	units		0	v157974924	1.2.8	0.5	A			1
2023	Canada	2021A000	Mining, quarrying, and oil and gas extraction [21]	Accelerate development of creative content	Percent	239	units		0	v157974932	1.3.1	34.4	E			1
2023	Canada	2021A000	Mining, quarrying, and oil and gas extraction [21]	Increase automation in tasks, without reducing employment	Percent	239	units		0	v157974932	1.3.2	48.3	E			1
2023	Canada	2021A000	Mining, quarrying, and oil and gas extraction [21]	Automate tasks to replace employees	Percent	239	units		0	v157974932	1.3.3	0.4	A			1
2023	Canada	2021A000	Mining, quarrying, and oil and gas extraction [21]	Achieve cost efficiencies	Percent	239	units		0	v157974932	1.3.4	39.7	E			1
2023	Canada	2021A000	Mining, quarrying, and oil and gas extraction [21]	Improve client or customer experience	Percent	239	units		0	v157974932	1.3.5	23.5	D			1
2023	Canada	2021A000	Mining, quarrying, and oil and gas extraction [21]	Drive data-driven decision making	Percent	239	units		0	v157974932	1.3.6	55.7	E			1
2023	Canada	2021A000	Mining, quarrying, and oil and gas extraction [21]	Minimize workforce recruitment and retention challenges	Percent	239	units		0	v157974932	1.3.7	6.3	B			1
2023	Canada	2021A000	Mining, quarrying, and oil and gas extraction [21]	Value or potential value created by Generative AI, other	Percent	239	units		0	v157974933	1.3.8	0.7	A			1
2023	Canada	2021A000	Construction [23]	Accelerate development of creative content	Percent	239	units		0	v157974941	1.4.1	78.4	D			1

No of column headers: 16
No of rows: 7505
Primary key: COORDINATE

Tools and Technologies used

- Apache Spark (DataFrame API) for data processing (data loading ,cleaning and transformations)

- MS Excel for basic data manipulation tasks to find the objectives.

- Plotly was utilized to create interactive charts for visualization.

- Jupyter Notebook and VSCode were the platforms used for coding and analysis.

- Git was used for version control, with the dataset stored in a GitHub repository for collaboration and tracking changes.

- https://github.com/rajprasadshrestha/groupassignments/tree/main/bigdatafundamentals)

Data cleaning and transformation

Data Cleaning:
1. Removed unnecessary columns from both datasets according to the objectives: "REF_DATE", "DGUID", "UOM", "UOM_ID", "SCALAR_FACTOR", "SCALAR_ID", "VECTOR", "STATUS", "SYMBOL", "TERMINATED", "DECIMALS".

2. Checked for and replaced all blanks and NULL values in each column with 0.

3. Removed rows where the GEO column value contains "CANADA" and eliminated certain business characteristics (such as North American Industry Classification System - NAICS) from the "Business characteristics" column.

Data Transformations:
1. Transformed the "Business characteristics" column values to contain only string values, removing unwanted characters such as numeric ranges (e.g., [31-33]), retaining only the descriptive string (e.g., "Agriculture, forestry, fishing and hunting").

2. Merged the two datasets using the COORDINATE value as a primary key for easier analysis.

Merged(Cleaned) dataset

| GEO	Business characteristics	Business's use of Generative AI	COORDINATE	ValueOfUsingGenerativeAI(%)	Value or potential value created by Generative AI	ValuePrdoucedByGenerativeAI(%)
Newfoundland and Labrador	Agriculture, forestry, fishing and hunting	Already using Generative AI	2.2.1	2.9	Accelerate development of creative content	88.3
Newfoundland and Labrador	Agriculture, forestry, fishing and hunting	Have plans to use Generative AI	2.2.2	5	Increase automation in tasks, without reducing employment	0
Newfoundland and Labrador	Agriculture, forestry, fishing and hunting	Considered using but have no current plans to implement Genera	2.2.3	7	Automate tasks to replace employees	0
Newfoundland and Labrador	Agriculture, forestry, fishing and hunting	Have not considered using Generative AI	2.2.4	85.1	Achieve cost efficiencies	0
Newfoundland and Labrador	Mining, quarrying, and oil and gas extraction	Already using Generative AI	2.3.1	5.2	Accelerate development of creative content	0
Newfoundland and Labrador	Mining, quarrying, and oil and gas extraction	Have plans to use Generative AI	2.3.2	3.3	Increase automation in tasks, without reducing employment	0
Newfoundland and Labrador	Mining, quarrying, and oil and gas extraction	Considered using but have no current plans to implement Genera	2.3.3	6.4	Automate tasks to replace employees	0
Newfoundland and Labrador	Mining, quarrying, and oil and gas extraction	Have not considered using Generative AI	2.3.4	85.1	Achieve cost efficiencies	0
Newfoundland and Labrador	Construction	Already using Generative AI	2.4.1	0	Accelerate development of creative content	0
Newfoundland and Labrador	Construction	Have plans to use Generative AI	2.4.2	0	Increase automation in tasks, without reducing employment	0
Newfoundland and Labrador	Construction	Considered using but have no current plans to implement Genera	2.4.3	4.6	Automate tasks to replace employees	0
Newfoundland and Labrador	Construction	Have not considered using Generative AI	2.4.4	95.4	Achieve cost efficiencies	0
Newfoundland and Labrador	Manufacturing	Already using Generative AI	2.5.1	5.1	Accelerate development of creative content	100
Newfoundland and Labrador	Manufacturing	Have plans to use Generative AI	2.5.2	0	Increase automation in tasks, without reducing employment	0
Newfoundland and Labrador	Manufacturing	Considered using but have no current plans to implement Genera	2.5.3	8	Automate tasks to replace employees	0
Newfoundland and Labrador	Manufacturing	Have not considered using Generative AI	2.5.4	87	Achieve cost efficiencies	0
Newfoundland and Labrador	Wholesale trade	Already using Generative AI	2.6.1	13.2	Accelerate development of creative content	0
Newfoundland and Labrador	Wholesale trade	Have plans to use Generative AI	2.6.2	6.9	Increase automation in tasks, without reducing employment	0
Newfoundland and Labrador	Wholesale trade	Considered using but have no current plans to implement Genera	2.6.3	18.5	Automate tasks to replace employees	0
Newfoundland and Labrador	Wholesale trade	Have not considered using Generative AI	2.6.4	61.3	Achieve cost efficiencies	0
Newfoundland and Labrador	Retail trade	Already using Generative AI	2.7.1	0.6	Accelerate development of creative content	0
Newfoundland and Labrador	Retail trade	Have plans to use Generative AI	2.7.2	3.6	Increase automation in tasks, without reducing employment	15.6
Newfoundland and Labrador	Retail trade	Considered using but have no current plans to implement Genera	2.7.3	13	Automate tasks to replace employees	0
Newfoundland and Labrador	Retail trade	Have not considered using Generative AI	2.7.4	82.8	Achieve cost efficiencies	0
Newfoundland and Labrador	Transportation and warehousing	Already using Generative AI	2.8.1	6.7	Accelerate development of creative content	0
Newfoundland and Labrador	Transportation and warehousing	Have plans to use Generative AI	2.8.2	0	Increase automation in tasks, without reducing employment	0
Newfoundland and Labrador	Transportation and warehousing	Considered using but have no current plans to implement Genera	2.8.3	1.3	Automate tasks to replace employees	0

No of column headers: 7
No of rows: 3433
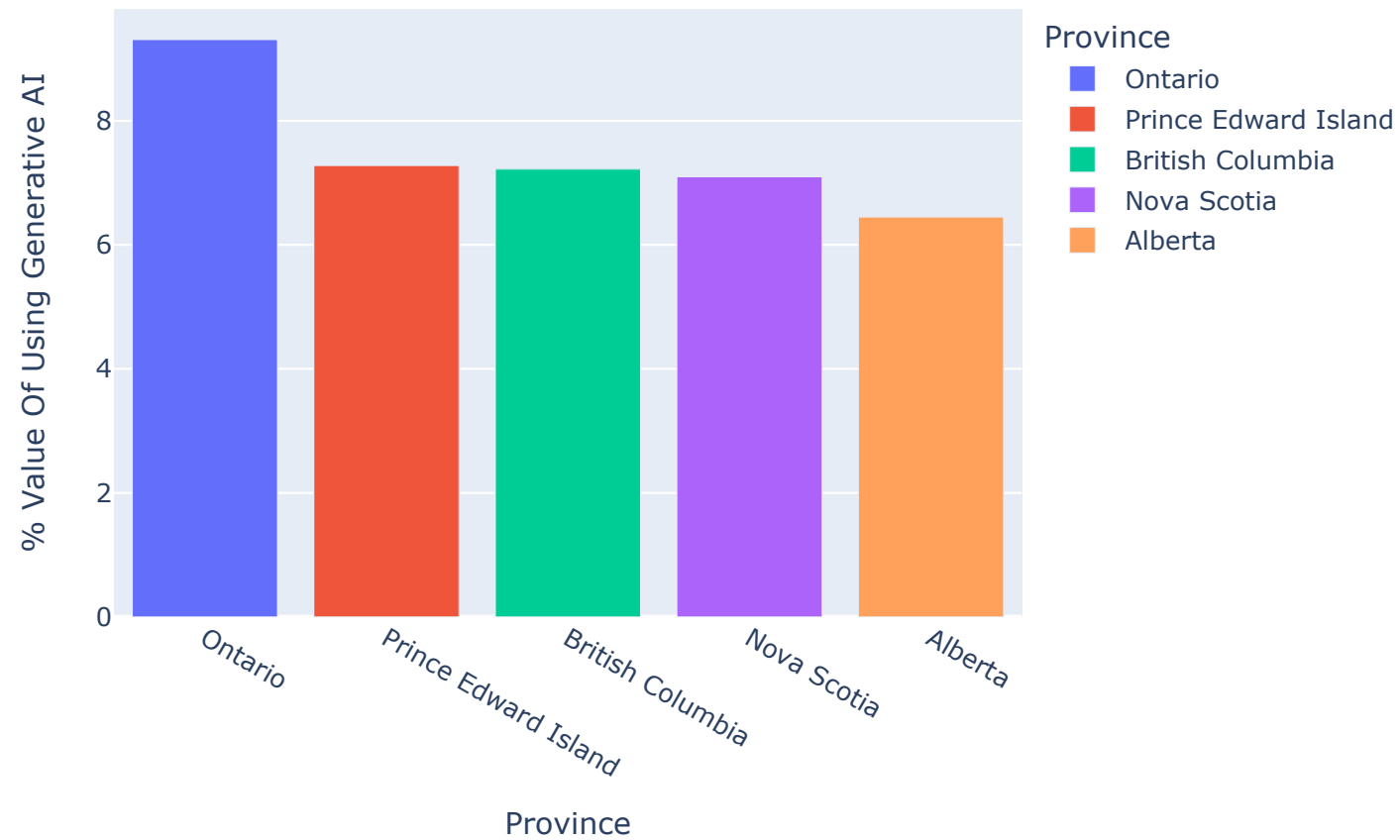**Primary key:** COORDINATE

Objective 1: What are the top 5 business sectors in Canada that use generative AI?

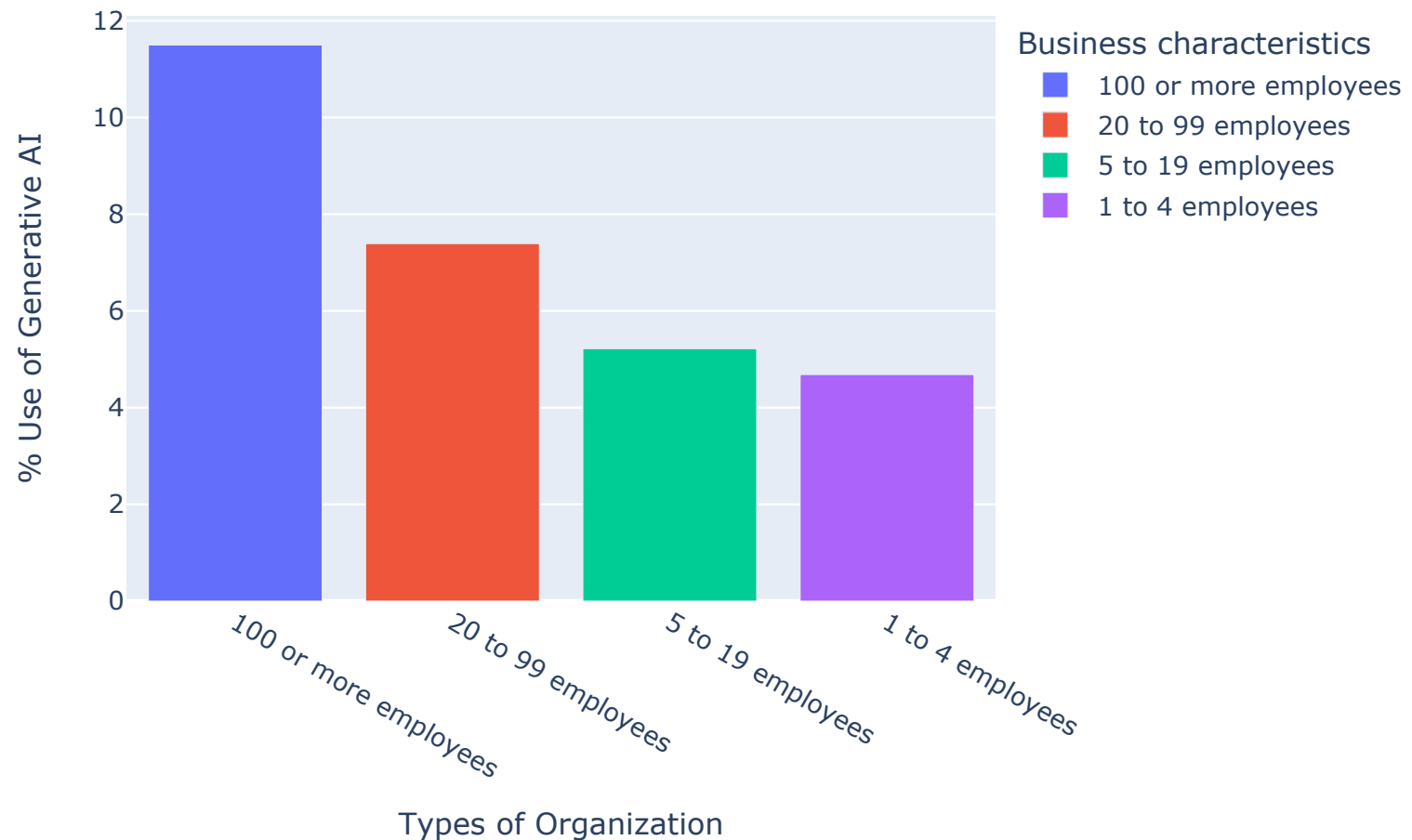Top 5 Business Sectors Already Using Generative AI across Canada
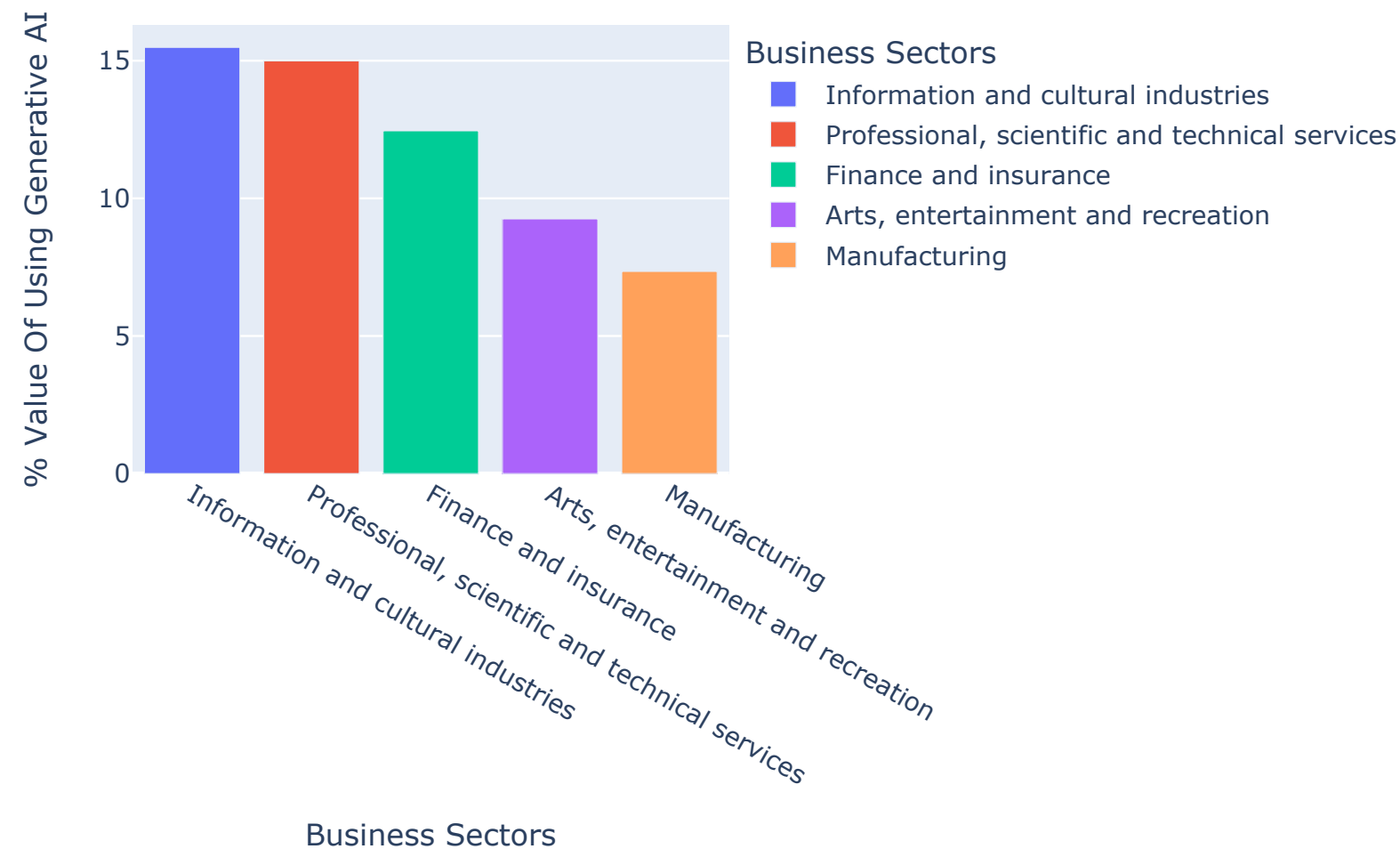
Objective 2: Which are the top 5 provinces in Canada using generative AI?

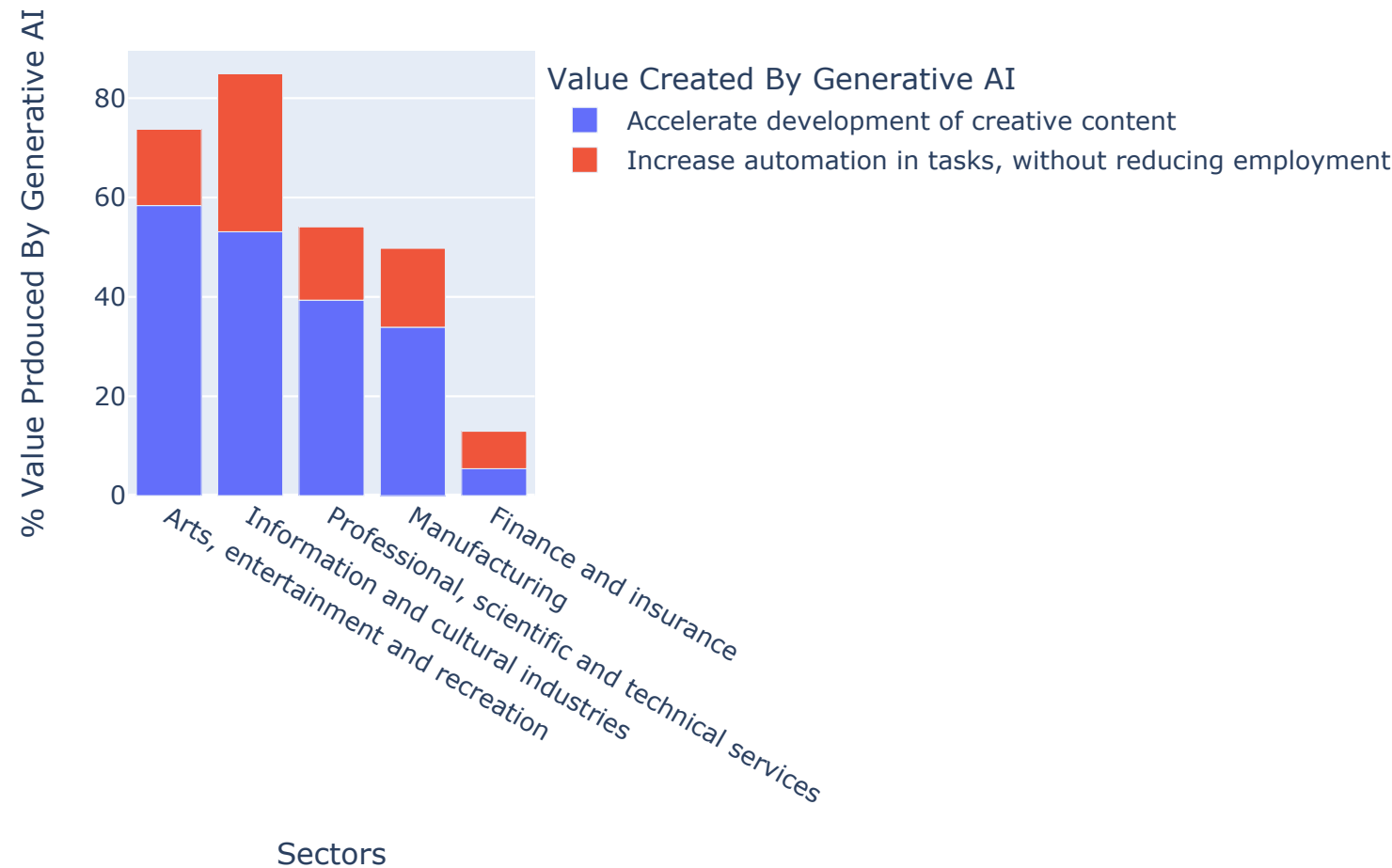Top 5 Provinces Already Using Generative AI in Canada

Objective 3: Do larger companies use generative AI more than small to medium-sized ones?

Generative AI used by various size of organizations in Canada

Objective 4: How much value is created created by using generative AI in top 5 business sectors ? Will generative AI replace jobs by reducing employment?

Business Characteristics that Accelerate Development of Creative Content and


% Value Prdouced By Generative AI

Value Created By Generative AI
- Accelerate development of creative content
- Increase automation in tasks, without reducing employment

Sectors

Arts, entertainment and recreation
Information and cultural industries
Professional, scientific and technical services
Manufacturing
Finance and insurance

Objective 5: What are the top 5 business sectors in Canada that don't plan to use generative AI, even though it could help them save costs?

Business characteristics or sectors	Business's use of generative AI
Construction	Have not considered using Generative AI
Agriculture, forestry, fishing and hunting	Have not considered using Generative AI
Transportation and warehousing	Have not considered using Generative AI
Mining, quarrying and oil and gas extraction	Have not considered using Generative AI
Wholesale trade	Have not considered using Generative AI

Objective 5:

Business Characteristics that Have not considered using Generative AI
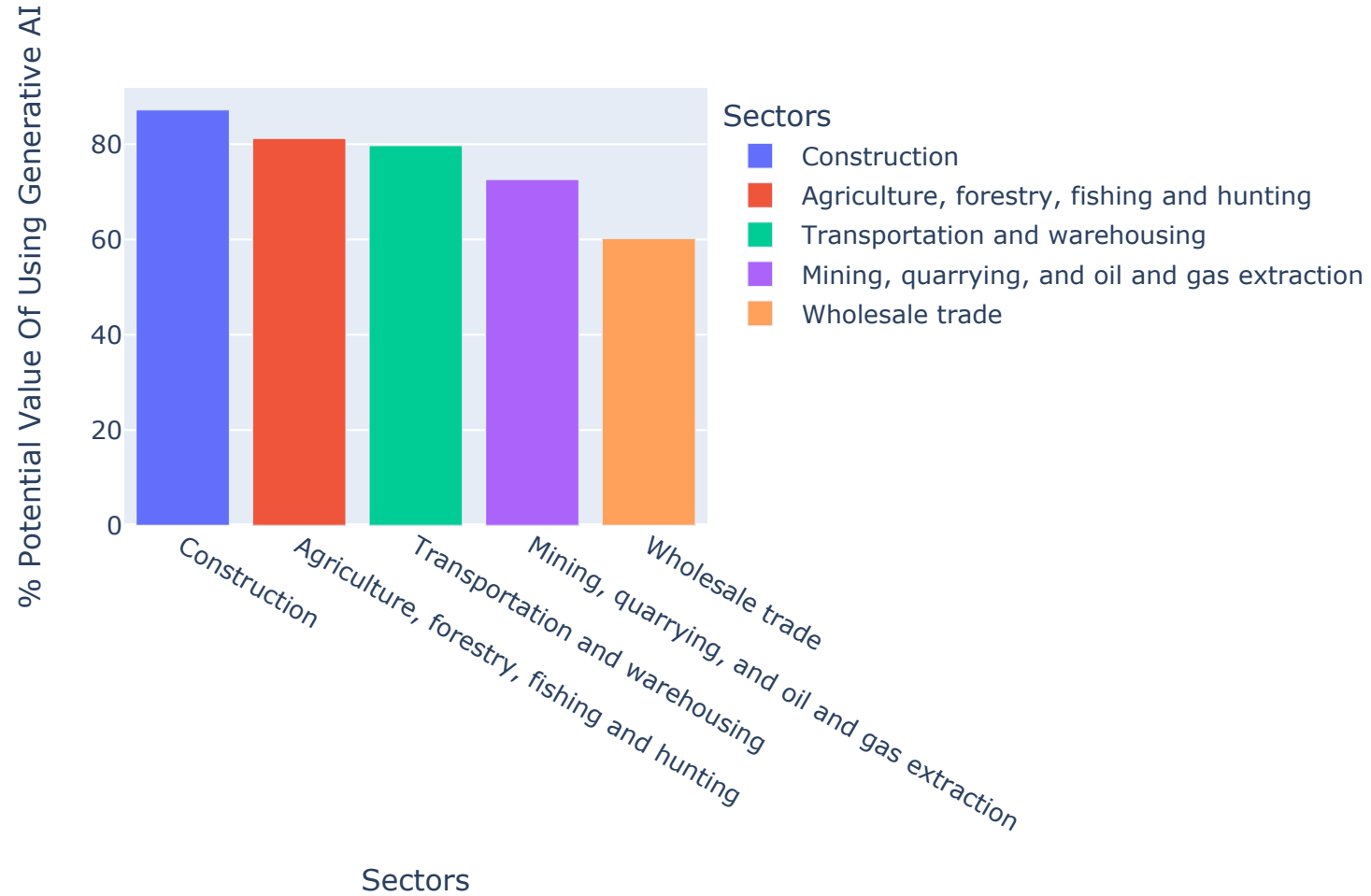
But they do have some plans to use Generative AI to automate Tasks to replace employees.

Conclusion

- Generative AI can be transformative labor- and money-saving technology.

- Generative AI usage can potentially create new job opportunities by increasing productivity and creating demand for skilled workers in AI development, maintenance, and oversight.

- Generative AI usage might enhance job roles by automating repetitive tasks, allowing employees to focus on higher-value, creative work.

- Generative AI implementations could lead to a shift in job roles, requiring retraining and upskilling programs to help workers adapt to changing job requirements in the digital age.

Thank you. 😁