



# NATIONAL SCIENCE BOARD SCIENCE & ENGINEERING INDICATORS 2024



## Industry Activities

# Production and Trade of Knowledge- and Technology-Intensive Industries

## Technical Appendix

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This publication is part of the 2024 edition of the *Science and Engineering Indicators (Indicators)* suite of reports. *Indicators* is prepared under the guidance of the National Science Board by the National Science Foundation's National Center for Science and Engineering Statistics. The *Indicators* suite consists of a summary report called *The State of U.S. Science and Engineering*, more-detailed thematic reports with supporting data, and a data tool that provides state-level indicators.



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## Technical Appendix

This appendix provides information on the classification of industries for output and trade cross-country data used in this report. Knowledge- and technology-intensive (KTI) industries are defined using a taxonomy of economic activities based on research and development (R&D) intensity developed in the *OECD Taxonomy of Economic Activities Based on R&D Intensity* (Organisation for Economic Co-operation and Development 2016). The *OECD Taxonomy* clusters industries into five R&D intensity groups—high, medium-high, medium, medium-low, and low—based on a measure of R&D intensity computed as the ratio of R&D expenditures to value added. KTI industries are those in the high and medium-high R&D intensity groups. See **Table SAKTI-1** and **Table SAKTI-2**. See the Glossary section for definitions.

**Table SAKTI-1**

### OECD classification of industries, by R&D intensity category

(Percent)

R&D intensity category	Manufacturing			Nonmanufacturing		
	ISIC, Rev.4, industry code	Name	R&D intensity (%)	ISIC, Rev.4, industry code	Name	R&D intensity (%)
High R&D intensity	303	Air and spacecraft and related machinery	31.69	72	Scientific R&D	30.39
	21	Pharmaceuticals	27.98	582	Software publishing	28.94
	26	Computer, electronic, and optical products	24.05			
Medium-high R&D intensity	252	Weapons and ammunition	18.87	62–63	IT and other information services	5.92
	29	Motor vehicles, trailers, and semi-trailers	15.36			
	325	Medical and dental instruments	9.29			
	28	Machinery and equipment nec	7.89			
	20	Chemicals and chemical products	6.52			
	27	Electrical equipment	6.22			
	30X	Railroad, military vehicles, and transport nec (ISIC 302, 304, and 309)	5.72			
Medium R&D intensity	22	Rubber and plastic products	3.58			
	301	Building of ships and boats	2.99			
	32X	Other manufacturing except medical and dental instruments	2.85			
	23	Other nonmetallic mineral products	2.24			
	24	Basic metals	2.07			
	33	Repair and installation of machinery and equipment	1.93			
Medium-low R&D intensity	13	Textiles	1.73	69–75X	Professional, scientific, and technical activities except scientific R&D services (ISIC 69–75 except 72)	1.76
	15	Leather and related products	1.65	61	Telecommunications	1.45
	17	Paper and paper products	1.58	05–09	Mining and quarrying	0.8
	10–12	Food products, beverages, and tobacco	1.44	581	Publishing of books and periodicals	0.57
	14	Wearing apparel	1.40			
	25X	Fabricated metal products except weapons and ammunition (ISIC 25 except 252)	1.19			
	19	Coke and refined petroleum products	1.17			

Table SAKTI-1

## OECD classification of industries, by R&amp;D intensity category

(Percent)

R&D intensity category	Manufacturing			Nonmanufacturing		
	ISIC, Rev.4, industry code	Name	R&D intensity (%)	ISIC, Rev.4, industry code	Name	R&D intensity (%)
	31	Furniture	1.17			
	16	Wood and products of wood and cork	0.70			
	18	Printing and reproductions of recorded media	0.67			
Low R&D intensity				64–66	Financial and insurance activities	0.38
					Electricity, gas, and water supply; waste management; and remediation	0.35
				35–39	Audiovisual and broadcasting activities	0.32
				45–47	Wholesale and retail trade	0.28
				01–03	Agriculture, forestry, and fishing	0.27
				41–43	Construction	0.21
				77–82	Administrative and support services	0.18
				90–99	Arts, entertainment, repair of household goods, and other services	0.11
				49–53	Transportation and storage	0.08
				55–56	Accommodation and food service activities	0.02
			68	Real estate activities	0.01	

ISIC, Rev.4 = International Standard Industrial Classification, Revision 4; IT = information technology; nec = not elsewhere classified; OECD = Organisation for Economic Co-operation and Development.

**Note(s):**

R&D intensity is measured as the ratio of R&D expenditures to value-added output of industry. Industries are classified according to ISIC, Rev.4.

**Source(s):**

Galindo-Rueda F, Verger F, 2016, *OECD Taxonomy of Economic Activities Based on R&D Intensity*, OECD Science, Technology and Industry Working Papers, No. 2016/04, available at <https://doi.org/10.1787/5jlv73sqqp8r-en>, accessed 15 February 2024.

Science and Engineering Indicators

Table SAKTI-2

## Concordance of NAICS 2012 industries to ISIC, Rev.4, industries, by R&amp;D intensity category

(Industry title and code)

R&D intensity category	Value added, by industry		NAICS 2012		ISIC, Rev.4	
	Industry title	Industry code	Industry title	Industry code	Industry title	
High R&D intensity	Pharmaceutical and medicine manufacturing	3254	Pharmaceutical and medicine manufacturing	21	Manufacture of pharmaceuticals, medicinal chemical and botanical products	
	Computer and electronic products	334	Computer and electronic product manufacturing	26	Manufacture of computer, electronic and optical products	
	Optical instrument and lens manufacturing	333314	Optical instrument and lens manufacturing			
	Aerospace product and parts manufacturing	3364	Aerospace product and parts manufacturing	303	Manufacture of air and spacecraft and related machinery	

Table SAKTI-2

## Concordance of NAICS 2012 industries to ISIC, Rev.4, industries, by R&amp;D intensity category

(Industry title and code)

R&D intensity category	Value added, by industry		NAICS 2012		ISIC, Rev.4	
	Industry title	Industry code	Industry title	Industry code	Industry title	
	Software publishers	5112	Software publishers	582	Software publishing	
	Scientific R&D services	5417	Scientific R&D services	72	Scientific R&D services	
Medium-high R&D intensity	Basic chemical manufacturing	3251	Basic chemical manufacturing	20	Manufacture of chemicals and chemical products	
	Resin, rubber, and artificial fibers manufacturing	3252	Resin, synthetic rubber and artificial synthetic fibers and filaments manufacturing			
	Other chemical manufacturing	3253	Pesticide, fertilizer and other agricultural chemical manufacturing			
		3255	Paint, coating and adhesive manufacturing			
		3256	Soap, cleaning compound and toilet preparation manufacturing			
		3259	Other chemical product and preparation manufacturing			
	Electrical equipment, appliances, and components	335	Electrical equipment, appliance and component manufacturing	27	Manufacture of electrical equipment	
	Agricultural implement manufacturing	3331	Agriculture, construction and mining machinery manufacturing	28	Manufacture of machinery and equipment nec	
	Construction machinery manufacturing					
	Mining and oil and gas field machinery manufacturing					
	Other machinery	3332	Industrial machinery manufacturing			
		333316	Photographic and photocopying equipment manufacturing			
		333318	Other commercial and service industry machinery manufacturing			
		3334	Ventilation, heating, air-conditioning and commercial refrigeration equipment manufacturing			
		333517	Machine tool manufacturing			
		333514	Special tool, die, jig and fixture manufacturing			
		333515	Cutting tool and machine tool accessory manufacturing			
		333519	Rolling mill and other metalworking machinery manufacturing			
		3336	Engine, turbine and power transmission equipment manufacturing			
	3339	Other general purpose machinery manufacturing				
Plumbing fixture fitting and trim manufacturing	332913	Plumbing fixture fitting and trim manufacturing				
Ball and roller bearing manufacturing	332991	Ball and roller bearing manufacturing				
Motor vehicle manufacturing	3361	Motor vehicle manufacturing	29	Manufacture of motor vehicles, trailers and semi-trailers		

Table SAKTI-2

## Concordance of NAICS 2012 industries to ISIC, Rev.4, industries, by R&amp;D intensity category

(Industry title and code)

R&D intensity category	Value added, by industry		NAICS 2012		ISIC, Rev.4	
	Industry title	Industry code	Industry title	Industry code	Industry title	
	Light truck and utility vehicle manufacturing					
	Heavy duty truck manufacturing					
	Motor vehicle body, trailer, and parts manufacturing		3362	Motor vehicle body and trailer manufacturing		
			33631	Motor vehicle gasoline engine and engine parts manufacturing		
			33632	Motor vehicle electrical and electronic equipment manufacturing		
			33633	Motor vehicle steering and suspension component (except spring) manufacturing		
			33634	Motor vehicle brake system manufacturing		
			33635	Motor vehicle transmission and power train parts manufacturing		
			33636	Motor vehicle seating and interior trim manufacturing		
		33639	Other motor vehicle parts manufacturing			
	All other transportation equipment manufacturing		3365	Railroad rolling stock manufacturing	30X	Manufacture of railroad, military vehicles and transport nec (ISIC 302, 304, and 309)
			3369	Other transportation equipment manufacturing		
	Medical equipment and supplies manufacturing		3391	Medical equipment and supplies manufacturing	325	Manufacture of medical and dental instruments and supplies
	Computer systems design and related services		5415	Computer systems design and related services	J62–J63	IT and other information services
	Data processing, internet publishing and other information services		518	Data processing, hosting and related services		
		519	Other information services			

ISIC, Rev.4 = International Standard Industrial Classification, Revision 4; IT = information technology; NAICS = North American Industry Classification System; nec = not elsewhere classified.

**Note(s):**

R&D intensity is measured as the ratio of R&D expenditures to value-added output of industry.

**Source(s):**

This concordance was developed using the Census Bureau 2012 NAICS to ISIC, Rev.4, concordance available at <https://www.census.gov/naics/>; more information on NAICS 2012 classification is available at <https://www.census.gov/naics/>, and more information on ISIC, Rev.4, is available at <https://unstats.un.org/unsd/classifications/Econ/Structure>.

Science and Engineering Indicators

Industry codes are based on the United Nations' International Standard Industrial Classification of All Economic Activities, Revision 4 (ISIC, Rev.4). This classification delineates the economic activities of industries based on similarities in inputs and factors of production, the process and technology of production, and characteristics and use of outputs. (For more information on ISIC, Rev.4, see <https://unstats.un.org/unsd/classifications/Econ/Structure>.)



## Reference

Organisation for Economic Co-operation and Development (OECD). 2016. *OECD Taxonomy of Economic Activities Based on R&D Intensity*. Paris: OECD Publishing. Available at <https://doi.org/10.1787/5jlv73sqqp8r-en>. Accessed 1 June 2023.