

Columbia Business School

Catching Growth Waves to 2050 and Beyond

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Instructor

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Introduction

Thirty years ago, the Internet was a curiosity, China was in the early years of its economic ascent and India had just begun economic liberalization. In the intervening years, emerging markets would come to dominate economic growth; and seven new companies would take their place among the ten largest in the world today, commanding a combined market capitalization of about \$9 trillion. When the pandemic struck in 2020, vast numbers of people in the world depended on the technologies these companies developed to communicate, work, and entertain themselves.

The changes we will see in the next thirty years will surpass those of the last thirty years. Some of today's emerging markets will have emerged by 2050, rising to become middle-income or upper middle-income economies. Scientific and technological advancements that are only now emerging will have matured, changing where and how we live and what we consume. Yet these positive changes are contingent on our ability to contain the effects of climate change and simultaneously provide enough energy, food and other goods to sustain economic growth. They also depend on our ability to limit the destabilizing force of economic inequality, and the fissures created by ideological differences between the old and new world powers.

The objective of this course is to examine the changes we can expect between now and mid-century, assess their implications and identify opportunities for businesses. We will examine three types of opportunities: (1) those arising because a larger, richer, more urban (but still unequal) world demands more goods and services; (2) those created by addressing the three intertwined challenges of subduing climate change, transforming energy supply, and changing food production; and (3) those arising from transformative technologies over the next thirty years. Some of these technologies --- including biotechnology, artificial intelligence, and robotics --- are poised to bring about changes that sound as fantastical as hyperconnected pocket supercomputer did thirty years ago. Emerging technologies in biology are expected to allow, for better and for worse, much greater control over the genetic basis of life, allow treating many presently incurable

diseases, and change the practice of medicine. Robots are likely to become a routine part of life, performing such varied tasks as assisting surgeons and interacting with people in social settings. Developments in vertical takeoff and landing technology are poised to allow electric “flying cars,” and hyperloop technology to provide dramatically faster travel within and between dense city clusters in which most humans will live by mid-century. And artificial intelligence, which is still in infancy, will likely transform almost every business and industry. These and other technologies will change the way we live and work, create new industries, and propel global growth waves that include consumers and companies not only in the developed world but also in emerging markets that are on the path to convergence with the developed economies.

Course objectives

The objective of this class is to understand the most important changes likely to occur in the next 30 years, and to develop capabilities that allow you to think strategically about how to anticipate and capture the opportunities likely to emerge from these changes. Our aim is to combine the development of a conceptual framework with real life examples and assignments that help you develop a strategy for a specific opportunity. The conceptual framework lays the ground to:

- Understand the drivers and patterns of past and future economic growth, including
 - New technologies that create and disrupt entire industries
 - Emerging markets that are increasingly converging and competing with developed economies
 - An increasingly more urban and affluent world in which the ability of many people to meet their needs and aspirations is matched by vast and rising inequalities
- Understand the interdependencies and key global challenges in the coming decades with a “new world map” in which China, and potentially India, compete for economic and technological leadership with the US. These challenges include
 - Climate change
 - Supplying food and energy to a growing urban world
 - Global trade and reliance with competing global powers and systems of government
- Analyze how new technologies may help address these issues and create new waves of opportunities

- Examples of emerging technologies with the potential to help address global issues and disrupt entire industries, including electric propulsion, robotics, quantum computing, machine learning and artificial intelligence
 - Cases of players that are at the forefront of leveraging these technologies
 - Strategic foresight as to the global waves of opportunities resulting from technological innovation in the “new world map” and potential strategies to capture them
- Apply the knowledge and frameworks from the class to develop a project analyzing an opportunity in an industry of your choice and developing a strategy to capture it
- Learn from and be exposed to a variety of emerging opportunities across industries and geographies.
 - Understand how different players value the opportunities, and how they weigh the risks and challenges involved in capturing them.

An additional benefit of this class is that it will allow you to gain some basic consulting skills, including framing and defining the scope of the strategic opportunity to be analyzed; developing hypothesis and defining the analysis to address them; gathering the right data and information; synthesizing information to drive key conclusions; and presenting well- structured recommendations and conclusions.

Class Structure

The class follows a structured sequence around three factors driving future growth waves: a growing world that is increasingly unequal and urban; facing global challenges; and new technologies and opportunities (see the session details below). Class time will be split among (i) lectures to develop a frame of reference on each of these types of waves and the business opportunities they generate; (ii) case discussions and assignments; and (iii) project work and presentations. There will be lectures in each of the first ten sessions. The last two sessions will be dedicated to having the groups present their different projects, answering questions, synthesizing what was learned and receiving feedback from the rest of the class.

Grading

Class attendance & participation	25%
Case analyses and assignment (group)*	30%
Project	45%
Total	100%

Session Details

Session, Date and Topic	Readings (R) and Cases (C)
A growing but unequal world	
1. Jan 5 Growth Waves: Drivers and outlook to 2050	- <u>Global Trends 2040</u> - <u>Long Slide Looms for World Population, With Sweeping Ramifications</u>
2. Jan 6 Economic development: Conditions and patterns	- <u>The Prospects for Developing Countries Are Not What They Once Were</u> - <u>The Flatbread Factor</u> - Case: Amazon in India
3. Jan 19 Urbanization to 2050	- <u>China Gambles on Modernizing Through Urbanization</u> - Case: Launch of the IPL
Facing global challenges	
4. Feb 2 Climate change: Problems, solutions, and opportunities to 2050	- <u>Fifth National Climate Assessment: Economics</u> - Case: <u>Impossible Foods: Fighting Climate Change with Plant-Based Meat</u>
5. Feb 3 Food: Feeding 9 billion by 2050	- Case: Bayer Crop Science
6. Feb 16 Energy: the changing world map Due: Project proposals	- <u>The New Power Superpowers</u> - <u>The Controversial Future of Nuclear Power in the U.S.</u> - Case: Iberdrola: Leading the Energy Revolution
New technologies	
7. Mar 1 Transportation: Electric, autonomous, and flying vehicles	- <u>China Races Ahead in Electric Vehicles</u> - <u>Self-driving cars begin to emerge from a cloud of hype</u> - <u>Advanced air mobility in 2030</u> - Case: Tesla Motors in 2021: Competition Revs Up
8. Mar 2 Artificial intelligence: past, present and future	- Past, present and future of AI - The Godfather of AI fears what he has built - Case: Google in an AI World

Session, Date and Topic	Readings (R) and Cases (C)
9. Mar 9 The future of robots Robotics assignment (see Canvas for details)	- <u>Modern automation (B): Robotics</u>
10. Mar 22 Life sciences revolution	- Watch <u>The Gene</u> (free access for PBS Passport members; otherwise, you can rent the film from <u>Amazon</u> or <u>iTunes</u>). - <u>Watch this video on CRISPR/Cas9</u> - Case: <u>CRISPR and the Ethics of Germline Editing</u>
11. and 12. Mar 23 and Apr 5 Final project presentations All students are required to attend both classes	

Readings and case assignments

You should read the assigned articles before a class session and prepare to discuss them in class. Several readings complement cases and provide frameworks for their analyses.

You should discuss the cases in your groups and submit 3-4 PowerPoint slides addressing the case questions. Submit these slides on Canvas by midday on Monday before the class in which a case is scheduled to be discussed. We will ask some of the groups with the best slides to present in class.

Project assignments

Form a group of 5 students during the first two weeks of class. Your group should work together on all class assignments and the final project.

Project proposal and final project

The aim of the project is to identify and analyze potential business opportunities in an industry that you expect to change and grow substantially due to new technologies and emerging needs in global markets over the coming decades.

Select an existing or nascent industry that interests you and that you expect to change substantially due to the multiple factors discussed in the course: an increasingly affluent but unequal, urban and aging population; growing global interdependence; global warming; increasing food and energy demand; growing tensions and competition for global power; and new technologies (such as artificial intelligence, robotics, and biotechnology) that can help solve problems, create new opportunities and potentially disrupt entire industries.

1. Examine how you expect the industry to develop or evolve over each of the next 10, 20 and 30 years. Which new technologies will impact it significantly? How will the products and services it offers be different from those available today? Which consumer segments will it impact and how will it change their lives? How will it change industry structure and the business models of companies?
2. Which are the established and potential new key players in this market? What are the capabilities they are likely to need to compete in the industry over each of the next 10, 20 and 30 years? Which of the well-established companies and startups in the industry are likely to fail and survive?
3. Suppose you ran one of the companies you expect to survive. Develop a strategy that the company should use over the next ten years. Discuss how this strategy is likely to evolve over the following decades.

I will provide feedback on the projects to all the group and give the go ahead for the final project. Once the proposal is approved you should schedule one more meeting with me to receive further feedback and guidance on the project.

[See examples of projects from previous term \(Canvas link\)](#)

Project deliverables: Each group will

- Submit a project proposal addressing point 1 above. The proposal should be in the form of 4-5 PowerPoint slides.
- Meet with me to present and discuss their project proposal. All students in a group must be present for the meetings with the instructors.
- Present the final project to the class during the last two sessions (a 20-minute presentation – around PowerPoint 15 slides).

Class rules

- Do not use any electronic devices other than the iPads provided by the school in class unless the instructor explicitly asks you to do so. Stay focused on the class.
- Attendance: Cases, presentations, and discussions are central to the learning. Do not miss any session without a valid reason.
- Class participation: I expect you to contribute to the learning of your classmates, both through class discussion and in collaboration on homework and the finals project. Good participation is defined as:
 - Active participation in case discussions, based on case preparation.

- Adding insights to discussions from course readings and your own knowledge and experience.
- Being respectful and prepared with thoughtful questions when other students are presenting, or when a guest speaker comes to class.

Generative AI Policy

You can use generative AI programs like ChatGPT and Bard to obtain information on the concepts and methods we discuss in class. However, generative AI models can hallucinate, and it is your responsibility to verify the information. You will not find generative AI useful for directly analyzing cases studies, or for your course project.

Inclusion, Accommodation, and Support for Students

At Columbia Business School we believe diversity strengthens any community or business and brings it greater success. The School is committed to providing all students with equal opportunity to thrive in the classroom by providing a learning, living, and working environment free from discrimination, harassment, and bias on the basis of gender, sexual orientation, race, ethnicity, socioeconomic status, or ability. Students with documented disabilities may receive reasonable accommodations. Students are encouraged to contact Columbia University's Office of Disability Services for information and to register for services. Columbia Business School adheres to all community, state, and federal regulations as relate to Title IX and student safety.

Honor Code and Academic Integrity

The Columbia Business School Honor Code calls on all members of the School community to adhere to and uphold the notions of truth, integrity, and respect both during their time in school, and throughout their careers as productive, moral, and caring participants in their companies and communities around the world. All students are subject to the Honor Code for all of their academic work. Failure to comply with the Honor Code may result in Dean's Discipline.

Recommended books

Although not required, you might enjoy reading the following books.

1. Mauro F. Guillen (2020), [2030: How Today's Biggest Trends Will Collide and Reshape the Future of Everything](#)
2. Bill Gates (2021), [How to Avoid a Climate Disaster: The Solutions We Have and the Breakthroughs We Need](#)

3. Daniel Yergin (2020), The New Map: Energy, Climate, and the Clash of Nations
4. Jane Jacobs (1992) The Death and Life of Great American Cities
5. David Sinclair (2019) Lifespan: Why We Age—and Why We Don't Have To
6. Eric Topol (2019) Deep Medicine: How Artificial Intelligence Can Make Healthcare Human Again
7. Jamie Metzel (2020) Hacking Darwin
8. Walter Isaacson (2021) The Code Breaker: Jennifer Doudna, Gene Editing, and the Future of the Human Race
9. Kai-Fu Lee and Chen Qiufan (2021), AI 2041: Ten Visions for Our Future (fiction)
10. Ishiguro, Kazuo (2021), Klara and the Sun: A novel (fiction)

You might also enjoy watching some of the following futuristic films.

1. Human Nature (on Netflix) chronicles the discovery of CRISPR
2. Gattaca
3. Jurassic Park
4. Blade Runner
5. A.I. Artificial Intelligence
6. Moneyball
7. Minority Report

About the instructor

Rajeev Kohli is the Ira Rennert Professor of Business at Columbia Business School. He



has research and teaching interests in marketing and policy issues in emerging markets, product development, pricing, and models of consumer choice. He has taught MBA and Executive MBA courses at Columbia Business School on *Catching Growth Waves: To 2050 and Beyond*, *Catching the Growth Waves in Emerging Markets*, *New Product Development*, *Information Technology in Marketing*, and *Marketing Planning*. He also teaches an MS course on *Social and Economic Networks* and a PhD course on *Mathematical Models in Marketing*.