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R&D Management & Development Solutions: Once Upon a Time, Sustainable Development!

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Abstract

The term R&D is widely linked to innovation both in the corporate and government sectors. R&D allows a company to stay ahead of its competition. Without an R&D program, a company may not survive on its own and may have to rely on other ways to innovate such as engaging in mergers and acquisitions (M&A) or partnerships. Through R&D, companies can design new products and improve their existing offerings. R&D is separate from most operational activities performed by a corporation. The research and/or development is typically not performed with the expectation of immediate profit. Instead, it is expected to contribute to the long-term profitability of a company. R&D may lead to patents, copyrights, and trademarks as discoveries are made and products created. Companies that set up and employ entire R&D departments commit substantial capital to the effort. They must estimate the risk-adjusted return on their R&D expenditures-which inevitably involves risk of capital-because there is no immediate payoff, and the return on investment (ROI) is uncertain. As more money is invested in R&D, the level of capital risk increases. Other companies may choose to outsource their R&D for a variety of reasons including size and cost. Companies across all sectors and industries undergo R&D activities. Corporations experience growth through these improvements and the development of new goods and services. Pharmaceuticals, semiconductors, and software/technology companies tend to spend the most on R&D. In Europe, R&D is known as research and technical or technological development (RTD).

Keywords: Management; R&D Management; Research and Development; Development; Sustainable Development

Introduction

What's Research and development?

Research and development (R&D) include activities that companies undertake to innovate and introduce new products and services. It is often the first stage in the development process. The goal is typically to take new products and services to market and add to the company's bottom line. Research and development (R&D) is a valuable tool for growing and improving your business. R&D involves researching your market and your customer needs and developing new and improved products and services to fit these needs. Businesses that have an R&D strategy have a greater chance of success than businesses that don't. An R&D strategy can lead to innovation and increased productivity and can boost your business's competitive advantage. Any project worth doing requires R&D, which stands for rip-off and duplicate. Kidding, we would never do that. We are talking about research and development (R&D), which builds the framework of what a company needs to introduce new products and services or improve existing ones. R&D is directly tied to the innovation process for corporations. It encompasses all of the developmental activities of a product (or service) prior to launch and gives companies a solid chance to stay ahead of the competition.

We can't stress enough the importance of R&D in corporate innovation. It lays the groundwork for an organization's entire future, without a dedicated effort toward innovation, a company's chance of survival in the market drops significantly. Corporations need change, change starts with innovation, and innovation starts with R&D. When followed correctly, it's a formula for success. The key is to not merge steps. Often, people believe R&D and innovation are the same things. Don't make that assumption! You know what they say about people who assume, right?

What Is the Difference Between R&D and Innovation Management?

Research and development are the set of innovative activities performed by corporations. For example, the R&D department within an organization is where scientists and other professionals develop new technologies. In contrast, innovation management is the process of taking new concepts and ideas and implementing them, resulting in the introduction of new or improved products or services.

Understanding the Importance of R&D in the Innovation Process

We feel as though you've drawn some ideas as to why R&D is essential to the innovation process. We're going to clarify it just in case.

It Provides Knowledge and Insight

Sometimes business leaders get lucky when swinging a bat in the dark, hoping they'll hit the success target. And by sometimes, we mean never. Corporate innovation is in no way a process that should be done blind. That being said, everything starts with a wild idea. Sometimes that idea goes nowhere. Sometimes it does. But that is the point of R&D, to figure out if you have a good idea on your hands or not.

Note: There are three types of research that can be done, listed below.

A. **Basic Research:** The objective is to fully understand one subject area forming the basis for applied research.

B. **Applied Research:** Applied research aims to answer one specific question to an existing problem.

C. **Development Research:** A systematic project that uses existing knowledge gained from research or practical experience to develop a new product, service, or process.

It's a Powerful Investment

Although the costs can be high, investing in R&D is a powerful investment into your corporation's future capabilities, and ultimately, success. Corporate innovation isn't meant to be a short-term solution. (Sorry, no immediate gratification here.) It's a long-term innovation strategy for continuous, sustainable leverage in the marketplace. R&D consistently drives innovation and when combined with a dedicated innovation management program, your company stays increasingly competitive and can keep up with (and exceed) shifting customer demands [1-10].

Note: Businesses that invest in R&D can receive different forms of funding, such as tax incentives like the SME incentive, the RDEC incentive (for large organizations), and grant-funded SMEs.

Improves Existing Products and Efficiencies

Corporations can gain a competitive advantage with research and development. It leads to improvements to existing products, right? And if the product is improved, the process of improving said product is likely done much more efficiently. There's no need for any "do-overs" or constant struggles-wasting time trying to fix or update the product. And like we mentioned in reason #1, having the knowledge and insight into the move your company is about to make makes it a lot less intimidating.

Bonus points: When R&D efforts efficiently lead to an improved something or other in your corporation, it typically reduces marginal costs and/or increases marginal productivity.

Allows New Product Development to Stay Competitive

This is an easy transition from the first few reasons because it essentially combines all into one. Efficiency, low costs, improved productivity, knowledgeable decision-making, innovative ideas, the list goes on really. Of course, new product development can be the strongest tactic of them all (explaining the title to this section), but all of these efforts give your corporation a significant competitive advantage. How can it not? Disruptive innovation. While R&D does play a huge role, it doesn't necessarily start there. Innovation starts with idea creation and innovation management. Once that wild idea is born and there is a clear path to manage it, R&D can begin to push it on its way, or not. Increased market envelopment, cost efficiency, competitive advancements, and trend-matching are important reasons corporations need to include R&D in the innovation process. R&D can help your company survive the changing market, stay relevant, and re-stake your claim as a market giant.

Understanding Research and Development (R&D)

The term R&D is widely linked to innovation both in the corporate and government sectors. R&D allows a company to stay ahead of its competition. Without an R&D program, a company may not survive on its own and may have to rely on other ways to innovate such as engaging in mergers and acquisitions (M&A) or partnerships. Through R&D, companies can design new products and improve their existing offerings. R&D is separate from most operational activities performed by a corporation. The research and/or development is typically not performed with the expectation of immediate profit. Instead, it is expected to contribute to the long-term profitability of a company. R&D may lead to patents, copyrights, and trademarks as discoveries are made and products created. Companies that set up and employ entire R&D departments commit substantial capital to the effort. They must estimate the risk-adjusted return on their R&D expenditures-which inevitably involves risk of capital-because

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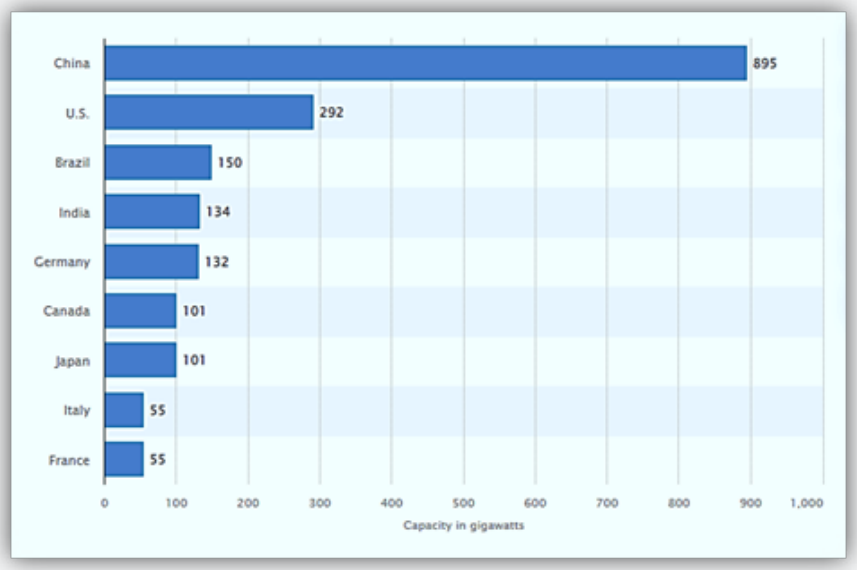

Figure 1: I will end this book and this chapter of the book with just this image, so that years later (around 2035), based on real and accurate statistics, you will see that these same countries will be the pioneers of world economy and politics!

Special Considerations

R&D Accounting

R&D may be beneficial to a company's bottom line, but it is considered an expense. After all, companies spend substantial amounts on research and trying to develop new products and services. As such, these expenses are often reported for accounting purposes on the income statement and do not carry long-term value. There are certain situations where R&D costs are capitalized and reported on the balance sheet. Some examples include but are not limited to:

- Materials, fixed assets, or other assets have alternative future uses with an estimable value and useful life.
- Software that can be converted or applied elsewhere in the company to have a useful life beyond a specific single R&D project.
- Indirect costs or overhead expenses allocated between projects.
- R&D purchased from a third party that is accompanied by intangible value. That intangible asset may be recorded as a separate balance sheet asset.

Who Spends the Most on R&D?

Companies spend billions of dollars on R&D to produce the newest, most sought-after products. According to public company filings, these companies incurred the highest research and development spend in 2020:

- Amazon: $42.7 billion
- Alphabet, Inc.: $27.6 billion
- Huawei: $22.0 billion
- Microsoft: $19.3 billion
- Apple: $18.8 billion
- Samsung: $18.8 billion
- Facebook: $18.5 billion

Types of Research and Development

One R&D model is a department staffed primarily by engineers who develop new products-a task that typically involves extensive research. There is no specific goal or application in mind with this model. Instead, the research is done for the sake of research. The second model involves a department composed of industrial

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scientists or researchers, all of who are tasked with applied research in technical, scientific, or industrial fields. This model facilitates the development of future products or the improvement of current products and/or operating procedures. There are also business incubators and accelerators, where corporations invest in startups and provide funding assistance and guidance to entrepreneurs in the hope that innovations will result that they can use to their benefit. Also, M&As and partnerships are forms of R&D as companies join forces to take advantage of other companies' institutional knowledge and talent.

R&D vs. Applied Research

Basic research is aimed at a fuller, more complete understanding of the fundamental aspects of a concept or phenomenon. This understanding is generally the first step in R&D. These activities provide a basis of information without directed applications toward products, policies, or operational processes. Applied research entails the activities used to gain knowledge with a specific goal in mind. The activities may be to determine and develop new products, policies, or operational processes. While basic research is time-consuming, applied research is painstaking and more costly because of its detailed and complex nature.

What Types of Activities Can Be Found in Research and Development?

Research and development activities focus on the innovation of new products or services in a company. Among the primary purposes of R&D activities is for a company to remain competitive as it produces products that advance and elevate its current product line. Since R&D typically operates on a longer-term horizon, its activities are not anticipated to generate immediate returns. However, in time, R&D projects may lead to patents, trademarks, or breakthrough discoveries with lasting benefits to the company.

What Is an Example of Research and Development?

Consider the example of Alphabet, which has allocated over $16 billion annually to R&D in 2018.2 Under its R&D arm X, the moonshot factory, it has developed Waymo self-driving cars. Meanwhile, Amazon has spent even more on R&D projects, with key developments on cloud computing and its cashier-less store Amazon Go. At the same time, R&D can take the approach of a merger & acquisition, where a company will leverage the talent and intel of another company to create a competitive edge. The same can be said with company investment in accelerators and incubators, whose developments it could later leverage.

Why is Research and Development Important?

Given the rapid rate of technological advancement, R&D is important for companies to stay competitive. Specifically, R&D allows companies to create products that are difficult for their competitors to replicate. Meanwhile, R&D efforts can lead to improved productivity that helps increase margins, further creating an edge in outpacing competitors. From a broader perspective, R&D can allow a company to stay ahead of the curve, anticipating customer demands or trends.

Role & Relevance Of R&D in Organization's Growth

R&D (Research & Development) plays a very important role in the success of a business. R&D contributes to sustainability of business. Many companies do not understand the importance of R&D until it is too late. It is the R&D function that provides a platform for creativity and innovation to flourish in an organization. Innovative breakthroughs have happened only because of painstaking efforts of the R&D function. Perseverant efforts are needed when one is in pursuit of research. Every failure in a R&D effort increases the pressure to perform. R&D helps a business to have a competitive edge over its competitors. It is the R&D function that develops plans much ahead other functions. The R&D function needs to have a clear foresight about future problems that need solutions. R&D (in its development role) can act as a catalyst for speeding up the growth of organization by way of introducing breakthrough products in the market [21-30].

R&D is very relevant in today's competitive scenario when customers are hankering after new products and new technologies. The firm that can successfully leverage its R&D efforts by translating the efforts in building new products will find itself ahead of its competitors. Expenses on R&D can be considered not as expenditure but as an investment. The ROI on R&D efforts can take a while to materialize. But once success is achieved, the financial returns can be quite high. Pharmaceutical companies, chemical companies, automotive companies, lubricant companies invest massive amounts of capital expenditure and revenue expenditure for this reason. These companies strive to be ahead of others in their learning curve. Some companies are technology leaders, while others are followers. Some industries prove to be laggards (they are the ones to wake up to the market realities a way bit late). Let us take the case of mobile phones. Today there are different types of models that are being launched on the market and are the result of intensive R&D efforts. Apple, Sony, 3M are the companies that are known for their breakthrough technologies - some of these technologies are albeit disruptive because they make the existing technologies redundant. 3M's scrotchbrite is one example that brought in the hygiene factor and capitalized on it. The turnaround time for new products in toothpastes (dental care products) has considerably shortened. Many firms have converted problems into opportunities only because of their R&D efforts. These companies eventually became technology leaders as they created a churn in the market.

All the modern inventions -laptops, palmtops, music players, iPods, mp3players, automatic washing machines, dishwashers, water filters are all examples of R&D efforts that had a successful

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outcome. Who would have thought that mosquitoes would provide an opportunity for new product development in the form of mosquito mats, repellent creams, vaporizers etc. Digital photography has made the conventional technique redundant. Computers have confined the typewriters to the museum. E-mail has rendered the snail mail defunct. The world moves on only through scientific inventions and discoveries which are result of sustained R&D effort .Only this leads to long term business sustainability. Sometimes R&D efforts are also necessitated to meet the regulatory norms eg: green technologies that reduce pollution. Hybrid cars, electric cars, catalytic converters in cars are examples of successful R&D efforts. The true test of R&D function lies in time to market. Business exists for the sake of making profits. So, the role of R&D in shortening the time to market becomes extremely important. Unless the R&D efforts in the lab cannot be scaled up within a reasonable time frame, little can be expected in terms of the functional credit to be assigned to R&D.

In India, the problems faced by R&D functions are one too many. It is high time the scenario changed. Germany is known for world class engineering and US is known for its research agenda. India, despite having a talent pool, still lacks in indigenous research. We have a situation where foreign companies like GE and Shell come and set up R&D centers here and gain competitive advantage globally. R&D becomes extremely relevant to make an organization future ready, to equip the business with the wherewithal required for commercialization of lab efforts through large scale production. R&D function can reasonably predict future technology trends. In an environment filled with resource constraints, R&D efforts in the right direction will enable allocation of scarce resources for the right purpose. R&D helps a business earn revenues through licensing of technology, technology transfer too. Information technology has developed so much in the last few years that change has become the norm in such sectors. There needs to be greater coordination between academic research and industry research. Companies tend to focus more on "development" and less on "research" mainly to meet short term operational goals. It must be understood clearly that R&D has a strategic orientation and using the R&D function to meet short term operational goals is anything but a wise more. Some firms use R&D as a cost center because of the depreciation allowance given by the Income Tax dept. This is indeed sad.

Developing an R&D Strategy

Your R&D strategy depends on the size of your business. In small businesses, R&D tends to focus more on product improvement because of budget and cost limitations. Larger businesses may be able to dedicate more time and resources to R&D to introduce new products as well as improve existing ones. The benefits of R&D are often long-term, so it's important to remember that your investment in it may not result in short-term profits. As well as product development and improvement, R&D can help you develop more efficient processes and new ways of delivering services. Spending more time and money on R&D does not guarantee it will be successful. The key to successful R&D is extensive market research to identify the needs and desires of your customers. You will need to revisit this research regularly as customer preferences frequently change.

Innovation in your Business

R&D can lead to innovations in your business. These may be in terms of new products and services, improved processes and new ways to interact with your customers. These innovations can result in greater profits and lower costs. Innovation is also a useful way to grow your business.

- R&D represents the activities companies undertake to innovate and introduce new products and services or to improve their existing offerings.
- R&D allows a company to stay ahead of its competition by catering to new wants or needs in the market.
- Companies in different sectors and industries conduct R&D-pharmaceuticals, semiconductors, and technology companies generally spend the most.
- R&D is often a broad approach to exploratory advancement, while applied research is more geared towards researching a narrower scope.
- The accounting for treatment for R&D costs can materially impact a company's income statement and balance sheet [31-40].

Support for R&D

Once new and improved products have been developed through R&D, businesses often seek to commercialize them so they can be sold on the market.

What's the Management?

Management (or managing) is the administration of an organization, whether it is a business, a nonprofit organization, or a government body. It is the art and science of managing resources of the business. Management includes the activities of setting the strategy of an organization and coordinating the efforts of its employees (or of volunteers) to accomplish its objectives through the application of available resources, such as financial, natural, technological, and human resources. "Run the business" and "Change the business" are two concepts that are used in management to differentiate between the continued delivery of goods or services and adapting of goods or services to meet the changing needs of customers - see trend. The term "management" may also refer to those people who manage an organization-managers. Some people study management at colleges or universities; major degrees in management includes the Bachelor of Commerce (B.Com.), Bachelor of Business

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Administration (BBA.), Master of Business Administration (MBA.), master's in management (MSM or MIM) and, for the public sector, the Master of Public Administration (MPA) degree. Individuals who aim to become management specialists or experts, management researchers, or professors may complete the Doctor of Management (DM), the Doctor of Business Administration (DBA), or the PhD in Business Administration or Management. In the past few decades, there has been a movement for evidence-based management.

Larger organizations generally have three hierarchical levels of managers, in a pyramid structure:

- Senior managers such as members of a board of directors and a chief executive officer (CEO) or a president of an organization sets the strategic goals and policy of the organization and make decisions on how the overall organization will operate. Senior managers are generally executive-level professionals who provide direction to middle management, and directly or indirectly report to them.

- Middle managers such as branch managers, regional managers, department managers, and section managers, who provide direction to the front-line managers. They communicate the strategic goals and policy of senior management to the front-line managers.

- Line managers such as supervisors and front-line team leaders, oversee the work of regular employees (or volunteers, in some voluntary organizations) and provide direction on their work. Line managers often perform the managerial functions that are traditionally considered as the core of management. Despite the name, they are usually considered part of the workforce and not part of the organization's management class.

In smaller organizations, a manager may have a much wider scope and may perform several roles or even all of the roles commonly observed in a large organization. The concept of management is well established and very familiar to scholars and practitioners alike. However, it is also very vague, with traditional text book definitions containing almost no concrete characteristics. This chapter aims at developing a more precise definition of management that clearly and fully captures the meaning and the content of the term. This is done by conducting a broad survey of literature and subjecting the main elements to critical analysis. Essential new definitory elements are also conceptualized. As a result, we suggest that management is a steering influence on market, production and/or resource operations in an organization and its units that may address both people and non-people issues and is exerted by multiple organizational actors through either anticipatory norm-setting or situational intervention with the aim of achieving the unit's objectives.

What's the MBA?

A Master of Business Administration (MBA; also Master's in Business Administration) is a postgraduate degree focused on business administration. The core courses in an MBA program cover various areas of business administration such as accounting, applied statistics, human resources, business communication, business ethics, business law, strategic management, business strategy, finance, managerial economics, management, entrepreneurship, marketing, supply-chain management, and operations management in a manner most relevant to management analysis and strategy. It originated in the United States in the early 20th century when the country industrialized and companies sought scientific management. Some programs also include elective courses and concentrations for further study in a particular area, for example, accounting, finance, marketing, and human resources, but an MBA is intended to be a generalized program. MBA programs in the United States typically require completing about forty to sixty credits (sixty to ninety in a quarter system), much higher than the thirty credits (thirty-six to forty-five in a quarter system) typically required for degrees that cover some of the same material such as the Master of Economics, Master of Finance, Master of Accountancy, Master of Science in Marketing and Master of Science in Management. The MBA is a terminal degree, and a professional degree. Accreditation bodies specifically for MBA programs ensure consistency and quality of education. Business schools in many countries offer programs tailored to full-time, part-time, executive (abridged coursework typically occurring on nights or weekends) and distance teaching students, many with specialized concentrations. An "Executive MBA", or EMBA, is a degree program similar to an MBA program that is specifically structured for and targeted towards corporate executives and senior managers who are already in the workforce [41-50].

Programs

Full-time MBA programs normally take place over two academic years (i.e., approximately 18 months of term time). For example, in the Northern Hemisphere, they often begin in late August or early September of year one and continue until May or June of year two, with a three to four-month summer break in between years one and two. Students enter with a reasonable amount of prior real-world work experience and take classes during weekdays like other university students. A typical full-time, accelerated, part-time, or modular MBA requires 60 credits (600 class hours) of graduate work. Accelerated MBA programs are a variation of the two-year programs. They involve a higher course load with more intense class and examination schedules and are usually condensed into one year. They usually have less downtime during the program and between semesters. For example, there is no three to four-month summer break, and between semesters there might be seven to ten days off rather than three to five weeks' vacation. Accelerated programs typically have a lower cost than full-time two-year programs. Part-time MBA programs normally hold classes on weekday evenings after normal working hours, or on weekends. Part-time programs normally last three years or more. The students in these programs typically consist

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of working professionals, who take a light course load for a longer period of time until the graduation requirements are met.

Evening (second shift) MBA programs are full-time programs that normally hold classes on weekday evenings, after normal working hours, or on weekends for a duration of two years. The students in these programs typically consist of working professionals, who cannot leave their work to pursue a full-time regular shift MBA. Most second shift programs are offered at universities in India. Modular MBA programs are similar to part-time programs, although typically employing a lock-step curriculum with classes packaged together in blocks lasting from one to three weeks. Executive (part-time) MBA (EMBA) programs developed to meet the educational needs of managers and executives, allowing students to earn an MBA (or another business-related graduate degree) in two years or less while working full-time. Participants come from every type and size of organization - profit, nonprofit, government - representing a variety of industries. EMBA students typically have a higher level of work experience, often 10 years or more, compared to other MBA students. In response to the increasing number of EMBA programs offered, The Executive MBA Council was formed in 1981 to advance executive education.

Full-time executive MBA programs are a new category of full-time one year MBA programs aimed at professionals with approximately five years or more. They are primarily offered in countries like India where the two-year MBA program is targeted at fresh graduates with no experience or minimal experience. These full-time executive MBA programs are similar to one year MBA programs offered by schools like Insead and IMD. Distance learning MBA programs hold class's off-campus. These programs can be offered in a number of different formats: correspondence courses by postal mail or email, non-interactive broadcast video, pre-recorded video, live teleconference or videoconference, offline or online computer courses. Many schools offer these programs. Blended learning programs combine distance learning with face-to-face instruction. These programs typically target working professionals who are unable to attend traditional part-time programs. MBA dual degree programs combine an MBA with others (such as an MS, MA, MEng, or a JD, etc.) to let students cut costs (dual programs usually cost less than pursuing two degrees separately), save time on education and to tailor the business education courses to their needs. This is generally achieved by allowing core courses of one program to count as electives in the other. Some business schools offer programs in which students can earn both a bachelor's degree in business administration and an MBA in five years. Mini-MBA is a term used by many non-profit and for-profit institutions to describe a training regimen focused on the fundamentals of business. In the past, Mini-MBA programs have typically been offered as non-credit bearing courses that require less than 100 hours of total learning. However, due to the criticisms of these certificates, many schools have now shifted their programs to offer courses for full credit so that they may be applied towards a complete traditional MBA degree. This is to allow students to verify business-related coursework for employment purposes and still allow the option to complete a full-time MBA degree program at a later period if they elect to do so.

Content

In general, MBA programs are structured around core courses -an essentially standard curriculum- and elective courses that (may) allow for a subject specialty or concentration. Thus, in the program's first year (or part), students acquire both a working knowledge of management functions and the analytical skills required for these, while in the second year (part), students pursue elective courses, which may count towards a specialization. (Topics in business ethics may be included at the generalist or specialist level.) After the first year, many full-time students seek internships. The degree culminates with coursework in business strategy, the program capstone. A dissertation or major project is usually a degree requirement after the completion of coursework. Many MBA programs end with a comprehensive exit examination; see below. For Executive MBA programs, the core curriculum is generally similar, but may seek to leverage the strengths associated with the more seasoned and professional profile of the student body, emphasizing leadership, and drawing more from the specific experience of the individual students.

Programs are designed such that students gain exposure to theory and practice alike. Courses include lectures, case studies, and team projects; the mix though, will differ by school and by format. Theory is covered in the classroom setting by academic faculty, and is reinforced through the case method, placing the student in the role of the decision maker. Similar to real world business situations, cases include both constraints and incomplete information. Practical learning (field immersion) often comprises consulting projects with real clients and is generally undertaken in teams (or "syndicates"). The practical elements (as well as the case studies) often involve external practitioners-sometimes business executives-supporting the teaching from academic faculty. The analytic skills required for management are usually covered initially. The accounting course(s) may treat financial and management accounting separately or in one hybrid course. Financial accounting deals mainly in the interpretation (and preparation) of financial statements while management accounting deals mainly in the analysis of internal results. The economics course covers managerial economics, a technical course that mainly focuses on product pricing as influenced by microeconomic theory, and aggregate-or macroeconomics, which deals with topics like the banking system, the money supply, and inflation. Operations Research and statistics are sometimes combined as "Managerial Decision-Making" or "Quantitative Decision-Making"; organizational behavior and human resource management may similarly be combined. In many programs, applicants with appropriate background may be exempt from

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various analytical courses [51-60].

As regards the functional courses, some programs treat the curricula here in two parts: the first course provides an overview, while the second revisits the subject in-depth (perhaps as specializations); alternatively, the first addresses short-term, tactical problems, while the second addresses long-term, strategic problems (e.g., "Financial Management I" might cover working capital management, while part II covers capital investment decisions). An Information systems / technology course is increasingly included as a core functional course rather than an elective. Ethics training is often delivered with coursework in corporate social responsibility and corporate governance. Note that courses here, although technical in the content, are, ultimately, oriented toward corporate management. (For example, the principal finance course may cover the technicalities of financial instrument valuation and capital raising but is in fact focused on managerial finance and financial management.) Technically oriented courses, if offered, will be via a specialization.

Programs may also include (coursework-based) training in the skills needed at senior levels of management: soft skills, such as (general) leadership and negotiation; hard skills, such as spreadsheets and project management; thinking skills such as innovation and creativity. Training in areas such as multiculturalism and corporate social responsibility is similarly included. Company visits (including overseas travel), and guest lectures or seminars with CEOs and management personalities may also be included. These, with the core subjects, provide the graduate with breadth, while the specialty courses provide depth. For the business strategy component, the degree capstone, the focus is on finding competitive advantage and the long-term positioning and management of the entity as a whole. Here, the key functional areas are thus synthesized to an overall view; the strategy course depicts how the various sub-disciplines integrate to tell one continuous story, with each discipline complementing the others. Corresponding training in business leadership may also be scheduled and participation in a business simulation or game is also a common degree requirement. "Strategy" may be offered as a sequence of courses, beginning in the first part (formulation) and culminating in the second (execution), or as a single intensive course, offered during the second part. Some programs offer a specialization in "strategy", others in management consulting which substantially addresses the same issues.

The MBA dissertation (or thesis in some universities) will, in general, comprise the following in some combination: a discussion of the literature, providing a critical review and structuring of what is known on a given topic, to address a specific problem; a case study that goes beyond simple description, containing the analysis of hitherto unpublished material; a test of the application or limitations of some known principle or technique in a particular situation, and/or suggested modifications. As an alternative to the dissertation, some programs instead allow for a major project. Here (part-time) students will address a problem current in their organization; particularly in programs with an action learning orientation, these may be practically oriented. Most MBA programs require additional course work in research methodology, preceding the dissertation or project. Some programs allow that the research component as a whole may be substituted with additional elective coursework.

Careers

An MBA prepares individuals for many types of careers. According to a survey by the Graduate Management Admissions Council, 64% of year 2012 MBA graduates used their MBA to change careers. Some of the more common jobs an MBA prepares one for include:

- Business analyst or strategist
- Business development analyst, associate, or manager
- Market research analyst
- Managing Director (of a department)
- Investment banker
- Entrepreneur/founder
- Financial analyst, associate, or manager
- Management consultant
- Marketing associate, analyst, or manager
- Portfolio manager
- Healthcare administrator, analyst, or manager
- Project analyst or strategist
- Product analyst, associate, or manager
- Program analyst, associate, or manager
- Operations analyst, associate, or manager

Sustainable Development

The Sustainable Development Goals or Global Goals are a set of 17 interconnected global goals designed to provide a blueprint for achieving a better and more sustainable future for all. Sustainable development goals, also known as global goals, were established by the United Nations in 2015 as a global call to action to end poverty, protect the planet and ensure that by 2030, all people will enjoy peace and prosperity, it was approved. The world is facing serious challenges of natural and environmental resources: such as climate change, reduction of fresh water, overfishing of the oceans, deforestation, water and air pollution and efforts to Billion Planet Nutrition. From an environmental point of view, sustainability is about the management and protection of natural resources, ecosystems, climate and the earth's atmosphere so that current

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and future generations can have a good life. Environmentally sustainable economic growth is another name for the concept of sustainable development. Its purpose is to achieve harmony between environmental sustainability, economic sustainability and socio-political sustainability. Sustainable development always encourages us to conserve and improve our resources by gradually changing the ways we develop and use technologies. All countries must meet their basic needs such as employment, food, energy, water and sanitation. Everyone has the right to a healthy, safe and clean environment. This can be easily achieved by reducing pollution, poverty and unemployment [61-70].

Sustainable development is an organizing principle for meeting human development goals while also sustaining the ability of natural systems to provide the natural resources and ecosystem services on which the economy and society depend. The desired result is a state of society where living conditions and resources are used to continue to meet human needs without undermining the integrity and stability of the natural system. Sustainable development can be defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs. While the modern concept of sustainable development is derived mostly from the 1987 Brundtland Report, it is also rooted in earlier ideas about sustainable forest management and 20th-century environmental concerns. As the concept of sustainable development developed, it has shifted its focus more towards economic development, social development and environmental protection for future generations. The UN-level Sustainable Development Goals (2015-2030) address global challenges, including poverty, inequality, climate change, environmental degradation, peace, and justice.

Definition

Sustainable development can be defined as the practice of maintaining productivity by replacing used resources with resources of equal or greater value without degrading or endangering natural biotic systems. Sustainable development binds together concern for the carrying capacity of natural systems with the social, political and economic challenges faced by humanity. Sustainability science is the study of the concepts of sustainable development and environmental science. There is an emphasis on the present generations' responsibility to regenerate, maintain and improve planetary resources for use by future generations.

History of Sustainable Development

The concept of sustainable development was the theme of the United Nations Conference on Environment and Development held in Rio de Janeiro in 1992. This summit was the first international effort to draw practical and strategic plans that would make it possible to move towards a model of sustainable development. How was the idea of sustainable development formed? The industrial revolution is involved in the emergence of the idea of sustainable development. Since the second half of the 19th century, Western societies have come to the conclusion that their economic and industrial activities have a significant impact on the environment and social balance. Several ecological and social crises occurred in the world and the need for a more sustainable model increased.

First United Nations Conference on Environment and Sustainable Development [1972]

In 1972, the United Nations Conference on the Environment was held in Stockholm - the first major meeting of world leaders convened by the United Nations to discuss human impact on the environment and how it relates to economic development. One of the main goals of this gathering was to find a common vision and common principles to inspire and guide the world's population to preserve the "human environment".

Three pillars and sustainable development [1994]

The three pillars are an important part of the foundations of sustainable development. The term was first used by John Elkington, founder of a sustainability consulting firm. Companies should consider 3 important pillars in their business - and not just think about their profits and losses. This means that organizations must measure the social responsibility of operations throughout their value chain as well as the environmental impact of their actions on the planet [71-80].

Development of the Concept

Origins

Sustainable development has its roots in ideas about sustainable forest management, which were developed in Europe during the 17th and 18th centuries. In response to a growing awareness of the depletion of timber resources in England, John Evelyn argued, in his 1662 essay Sylva that "sowing and planting of trees had to be regarded as a national duty of every landowner, in order to stop the destructive over-exploitation of natural resources." In 1713, Hans Carl von Carlowitz, a senior mining administrator in the service of Elector Frederick Augustus I of Saxony published Sylvicultura economics, a 400-page work on forestry. Building upon the ideas of Evelyn and French minister Jean-Baptiste Colbert, von Carlowitz developed the concept of managing forests for sustained yield. His work influenced others, including Alexander von Humboldt and Georg Ludwig Hartig, eventually leading to the development of the science of forestry. This, in turn, influenced people like Gifford Pinchot, the first head of the US Forest Service, whose approach to forest management was driven by the idea of wise use of resources, and Aldo Leopold whose land ethic was influential in the development of the environmental movement in the 1960s.

Following the publication of Rachel Carson's Silent Spring in 1962, the developing environmental movement drew attention

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to the relationship between economic growth and environmental degradation. Kenneth E. Boulding, in his influential 1966 essay The Economics of the Coming Spaceship Earth, identified the need for the economic system to fit itself to the ecological system with its limited pools of resources. Another milestone was the 1968 article by Garrett Hardin that popularized the term "tragedy of the commons". One of the first uses of the term sustainable in the contemporary sense was by the Club of Rome in 1972 in its classic report on the Limits to Growth, written by a group of scientists led by Dennis and Donella Meadows of the Massachusetts Institute of Technology. Describing the desirable "state of global equilibrium", the authors wrote: "We are searching for a model output that represents a world system that is sustainable without sudden and uncontrolled collapse and capable of satisfying the basic material requirements of all of its people."

In 1980, the International Union for Conservation of Nature published a world conservation strategy that included one of the first references to sustainable development as a global priority and introduced the term "sustainable development". Two years later, the United Nations World Charter for Nature raised five principles of conservation by which human conduct affecting nature is to be guided and judged. In 1987, the United Nations World Commission on Environment and Development released the report Our Common Future, commonly called the Brundtland Report. The report included what is now one of the most widely recognized definitions of sustainable development. Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains. Within it two key concepts: The concept of 'needs', in particular, the essential needs of the world's poor, to which overriding priority should be given; and the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs [81-90].

Since the Brundtland Report, the concept of sustainable development has developed beyond the initial intergenerational framework to focus more on the goal of "socially inclusive and environmentally sustainable economic growth". In 1992, the UN Conference on Environment and Development published the Earth Charter, which outlines the building of a just, sustainable, and peaceful global society in the 21st century. The action plan Agenda 21 for sustainable development identified information, integration, and participation as key building blocks to help countries achieve development that recognizes these interdependent pillars. It emphasizes that in sustainable development, everyone is a user and provider of information. It stresses the need to change from old sector-centered ways of doing business to new approaches that involve cross-sectoral co-ordination and the integration of environmental and social concerns into all development processes. Furthermore, Agenda 21 emphasizes that broad public participation in decision making is a fundamental prerequisite for achieving sustainable development.

Under the principles of the United Nations Charter the Millennium Declaration identified principles and treaties on sustainable development, including economic development, social development and environmental protection. Broadly defined, sustainable development is a systems approach to growth and development and to manage natural, produced, and social capital for the welfare of their own and future generations. The term sustainable development as used by the United Nations incorporates both issues associated with land development and broader issues of human development such as education, public health, and standard of living. A 2013 study concluded that sustainability reporting should be reframed through the lens of four interconnected domains: ecology, economics, politics and culture.

Reception

The concept of sustainable development has been, and still is, subject to criticism, including the question of what is to be sustained in sustainable development. It has been argued that there is no such thing as a sustainable use of a non-renewable resource, since any positive rate of exploitation will eventually lead to the exhaustion of earth's finite stock; this perspective renders the Industrial Revolution as a whole unsustainable. The sustainable development debate is based on the assumption that societies need to manage three types of capital (economic, social, and natural), which may be non-substitutable and whose consumption might be irreversible. Leading ecological economist and steady-state theorist Herman Daly, for example, points to the fact that natural capital can not necessarily be substituted by economic capital. While it is possible that we can find ways to replace some natural resources, it is much more unlikely that they will ever be able to replace eco-system services, such as the protection provided by the ozone layer, or the climate stabilizing function of the Amazonian Forest. In fact, natural capital, social capital and economic capital are often complementarities. A further obstacle to substitutability lies also in the multi-functionality of many natural resources. Forests, for example, not only provide the raw material for paper but they also maintain biodiversity, regulate water flow, and absorb CO_2.

Requirements

Six interdependent capacities are deemed to be necessary for the successful pursuit of sustainable development. These are the capacities to measure progress towards sustainable development; promote equity within and between generations; adapt to shocks and surprises; transform the system onto more sustainable development pathways; link knowledge with action for sustainability; and to devise governance arrangements that allow people to work together in exercising the other capacities [91-100].

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Dimensions

Sustainable development can be thought of in terms of three spheres, dimensions, domains or pillars: the environment, the economy and society. The three-sphere framework has also been worded as "economic, environmental and social" or "ecology, economy and equity". This has been expanded by some authors to include a fourth pillar of culture, institutions or governance, or alternatively reconfigured as four domains of the social - ecology, economics, politics and culture, thus bringing economics back inside the social, and treating ecology as the intersection of the social and the natural.

Sustainable Development Goals

The Sustainable Development Goals (SDGs) or Global Goals are a collection of 17 interlinked global goals designed to be a "blueprint to achieve a better and more sustainable future for all". The SDGs were set up in 2015 by the United Nations General Assembly (UN-GA) and are intended to be achieved by the year 2030. They are included in a UN-GA Resolution called the 2030 Agenda or what is colloquially known as Agenda 2030. The SDGs were developed in the Post-2015 Development Agenda as the future global development framework to succeed the Millennium Development Goals which ended in 2015.

Pathways

Deforestation and increased road-building in the Amazon rainforest are a concern because of increased human encroachment upon wilderness areas, increased resource extraction and further threats to biodiversity. The ecological stability of human settlements is part of the relationship between humans and their natural, social and built environments. Also termed human ecology, this broadens the focus of sustainable development to include the domain of human health. Fundamental human needs such as the availability and quality of air, water, food and shelter are also the ecological foundations for sustainable development; addressing public health risk through investments in ecosystem services can be a powerful and transformative force for sustainable development which, in this sense, extends to all species. Environmental sustainability concerns the natural environment and how it endures and remains diverse and productive. Since natural resources are derived from the environment, the state of air, water, and the climate is of particular concern. The IPCC Fifth Assessment Report outlines current knowledge about scientific, technical and socio-economic information concerning climate change, and lists options for adaptation and mitigation. Environmental sustainability requires society to design activities to meet human needs while preserving the life support systems of the planet. This, for example, entails using water sustainably, using renewable energy and sustainable material supplies (e.g., harvesting wood from forests at a rate that maintains the biomass and biodiversity).An unsustainable situation occurs when natural capital (the total of nature's resources) is used up faster than it can be replenished. Sustainability requires that human activity only uses nature's resources at a rate at which they can be replenished naturally. The concept of sustainable development is intertwined with the concept of carrying capacity. Theoretically, the long-term result of environmental degradation is the inability to sustain human life. Such degradation on a global scale should imply an increase in human death rate until population falls to what the degraded environment can support Table 1. Pollution of the public resources is not a different action, it is just a reverse tragedy of the commons, in that instead of taking something out, and something is put into the commons. When the costs of polluting the commons are not calculated into the cost of the items consumed, then it becomes only natural to pollute, as the cost of pollution is external to the cost of the goods produced and the cost of cleaning the waste before it is discharged exceeds the cost of releasing the waste directly into the commons. One of the ways to mitigate this problem is by protecting the ecology of the commons by making it, through taxes or fines, more costly to release the waste directly into the commons than would be the cost of cleaning the waste before discharge.

Table 1: Human death rate until population falls to what the degraded environment can support.

Consumption of Natural Resources	State of the Environment	Sustainability
More than nature's ability to replenish	Environmental degradation	Not sustainable
Equal to nature's ability to replenish	Environmental equilibrium	Steady state economy
Less than nature's ability to replenish	Environmental renewal	Environmentally sustainable

Land Use Changes, Agriculture and Food

Alterations in the relative proportions of land dedicated to urbanization, agriculture, forest, woodland, grassland and pasture have a marked effect on the global water, carbon and nitrogen biogeochemical cycles and this can impact negatively on both natural and human systems. At the local human scale, major sustainability benefits accrue from sustainable parks and gardens and green cities. Feeding almost eight billion human bodies takes a heavy toll on the Earth's resources. This begins with the appropriation of about 38% of the Earth's land surface and about 20% of its net primary productivity. Added to this are the resource -hungry activities of industrial agribusiness- everything from the crop need for irrigation water, synthetic fertilizers and pesticides to the resource costs of food packaging, transport (now a major part of global trade) and retail. Environmental problems associated

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with industrial agriculture and agribusiness are now being addressed through such movements as sustainable agriculture, organic farming and more sustainable business practices. The most cost-effective mitigation options include afforestation, sustainable forest management, and reducing deforestation. The environmental effects of different dietary patterns depend on many factors, including the proportion of animal and plant foods consumed and the method of food production. At the global level the environmental impact of agribusiness is being addressed through sustainable agriculture and organic farming. At the local level there are various movements working towards sustainable food systems which may include local food production, slow food, sustainable gardening, and organic gardening [101-110].

Materials and Waste

As global population and affluence have increased, so has the use of various materials increased in volume, diversity, and distance transported. Included here are raw materials, minerals, synthetic chemicals (including hazardous substances), manufactured products, food, living organisms, and waste. By 2050, humanity could consume an estimated 140 billion tons of minerals, ores, fossil fuels and biomass per year (three times its current amount) unless the economic growth rate is decoupled from the rate of natural resource consumption. Developed countries' citizens consume an average of 16 tons of those four key resources per capita per year, ranging up to 40 or more tons per person in some developed countries with resource consumption levels far beyond what is likely sustainable. By comparison, the average person in India today consumes four tons per year. Sustainable use of materials has targeted the idea of dematerialization, converting the linear path of materials (extraction, use, disposal in landfill) to a circular material flow that reuses materials as much as possible, much like the cycling and reuse of waste in nature. Dematerialization is being encouraged through the ideas of industrial ecology, eco design and ecolabelling. The use of sustainable biomaterials that come from renewable sources and that can be recycled is preferred to the use on non-renewables from a life cycle standpoint. This way of thinking is expressed in the concept of circular economy, which employs reuse, sharing, repair, refurbishment, remanufacturing and recycling to create a closed-loop system, minimizing the use of resource inputs and the creation of waste, pollution and carbon emissions. The European Commission has adopted an ambitious Circular Economy Action Plan in 2020, which aims at making sustainable products the norm in the EU.

Improving on Economic and Social Aspects

It has been suggested that because of rural poverty and overexploitation, environmental resources should be treated as important economic assets, called natural capital. Economic development has traditionally required a growth in the gross domestic product. This model of unlimited personal and GDP growth may be over. Sustainable development may involve improvements in the quality of life for many but may necessitate a decrease in resource consumption. According to ecological economist Malte Faber, ecological economics is defined by its focus on nature, justice, and time. Issues of intergenerational equity, irreversibility of environmental change, uncertainty of long-term outcomes, and sustainable development guide ecological economic analysis and valuation.

As early as the 1970s, the concept of sustainability was used to describe an economy "in equilibrium with basic ecological support systems". Scientists in many fields have highlighted The Limits to Growth, and economists have presented alternatives, for example a 'steady-state economy', to address concerns over the impacts of expanding human development on the planet. In 1987, the economist Edward Barbier published the study The Concept of Sustainable Economic Development, where he recognized that goals of environmental conservation and economic development are not conflicting and can be reinforcing each other. A World Bank study from 1999 concluded that based on the theory of genuine savings, policymakers have many possible interventions to increase sustainability, in macroeconomics or purely environmental. Several studies have noted that efficient policies for renewable energy and pollution are compatible with increasing human welfare, eventually reaching a golden-rule steady state.

However, Gilbert Rist says that the World Bank has twisted the notion of sustainable development to prove that economic development need not be deterred in the interest of preserving the ecosystem. He writes: "From this angle, 'sustainable development' looks like a cover-up operation... The thing that is meant to be sustained is really 'development', not the tolerance capacity of the ecosystem or of human societies." The World Bank, a leading producer of environmental knowledge, continues to advocate the win-win prospects for economic growth and ecological stability even as its economists express their doubts. Herman Daly, an economist for the Bank from 1988 to 1994, writes: When authors of WDR '92 [the highly influential 1992 World Development Report that featured the environment] were drafting the report, they called me asking for examples of "win-win" strategies in my work. What could I say? None exists in that pure form; there are trade-offs, not "win-wins." But they want to see a world of "win-wins" based on articles of faith, not fact. I wanted to contribute because WDRs are important in the Bank, [because] task managers read [them] to find philosophical justification for their latest round of projects. But they did not want to hear about how things really are, or what I find in my work.

A Meta review in 2002 looked at environmental and economic valuations and found a lack of "sustainability policies". A study in 2004 asked if humans consume too much. A study concluded in 2007 that knowledge, manufactured and human capital (health and education) has not compensated for the degradation of natural capital in many parts of the world. It has been suggested that intergenerational equity can be incorporated into sustainable

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development and decision making, as has become common in economic valuations of climate economics. A Meta review in 2009 identified conditions for a strong case to act on climate change, and called for more work to fully account of the relevant economics and how it affects human welfare. According to John Baden, a free-market environmentalist, "the improvement of environment quality depends on the market economy and the existence of legitimate and protected property rights". They enable the effective practice of personal responsibility and the development of mechanisms to protect the environment. The State can in this context "create conditions which encourage the people to save the environment"

Environmental Economics

The total environment includes not just the biosphere of Earth, air, and water, but also human interactions with these things, with nature, and what humans have created as their surroundings. As countries around the world continue to advance economically, they put a strain on the ability of the natural environment to absorb the high level of pollutants that are created as a part of this economic growth. Therefore, solutions need to be found so that the economies of the world can continue to grow, but not at the expense of the public good. In the world of economics, the amount of environmental quality must be considered as limited in supply and therefore is treated as a scarce resource. This is a resource to be protected. One common way to analyze possible outcomes of policy decisions on the scarce resource is to do a cost-benefit analysis. This type of analysis contrasts different options of resource allocation and, based on an evaluation of the expected courses of action and the consequences of these actions, the optimal way to do so in the light of different policy goals can be elicited. Further complicating this analysis are the interrelationships of the various parts of the environment that might be impacted by the chosen course of action. Sometimes, it is almost impossible to predict the various outcomes of a course of action, due to the unexpected consequences and the number of unknowns that are not accounted for in the benefit-cost analysis [111-120].

Management Of Human Consumption and Impacts

Waste generation, measured in kilograms per person per day. The environmental impact of a community or humankind as a whole depends both on population and impact per person, which in turn depends in complex ways on what resources are being used, whether or not those resources are renewable, and the scale of the human activity relative to the carrying capacity of the ecosystems involved. Careful resource management can be applied at many scales, from economic sectors like agriculture, manufacturing and industry, to work organizations, the consumption patterns of households and individuals, and the resource demands of individual goods and services. The underlying driver of direct human impacts on the environment is human consumption. This impact is reduced by not only consuming less but also making the full cycle of production, use, and disposal more sustainable. Consumption of goods and services can be analyzed and managed at all scales through the chain of consumption, starting with the effects of individual lifestyle choices and spending patterns, through to the resource demands of specific goods and services, the impacts of economic sectors, through national economies to the global economy. Analysis of consumption patterns relates resource use to the environmental, social and economic impacts at the scale or context under investigation. The ideas of embodied resource use (the total resources needed to produce a product or service), resource intensity, and resource productivity are important tools for understanding the impacts of consumption. Key resource categories relating to human needs are food, energy, raw materials and water.

In 2010, the International Resource Panel published the first global scientific assessment on the impacts of consumption and production. The study found that the most critical impacts are related to ecosystem health, human health and resource depletion. From a production perspective, it found that fossil-fuel combustion processes, agriculture and fisheries have the most important impacts. Meanwhile, from a final consumption perspective, it found that household. Consumption related to mobility, shelter, food, and energy-using products causes the majority of life-cycle impacts of consumption. According to the IPCC Fifth Assessment Report, human consumption, with current policy, by the year 2100 will be seven times bigger than in the year 2010.

Biodiversity and Ecosystem Services

In 2019, a summary for policymakers of the largest, most comprehensive study to date of biodiversity and ecosystem services was published by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. It recommended that human civilization will need a transformative change, including sustainable agriculture, reductions in consumption and waste, fishing quotas and collaborative water management.

Technology

Before flue-gas desulfurization was installed, the air-polluting emissions from this power plant in New Mexico contained excessive amounts of sulfur dioxide. A sewage treatment plant that uses solar energy, located at Santuari de Lluc monastery, Majorca. One of the core concepts in sustainable development is that technology can be used to assist people to meet their developmental needs. Technology to meet these sustainable development needs is often referred to as appropriate technology, which is an ideological movement (and its manifestations) originally articulated as intermediate technology by the economist E. F. Schumacher in his influential work Small Is Beautiful and now covers a wide range of technologies. Both Schumacher and many modern-day proponents of appropriate technology also

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emphasise the technology as people-centered. Today appropriate technology is often developed using open source principles, which have led to open-source appropriate technology (OSAT) and thus many of the plans of the technology can be freely found on the Internet. OSAT has been proposed as a new model of enabling innovation for sustainable development.

Business

The most broadly accepted criterion for corporate sustainability constitutes a firm's efficient use of natural capital. This eco-efficiency is usually calculated as the economic value added by a firm in relation to its aggregated ecological impact. This idea has been popularized by the World Business Council for Sustainable Development (WBCSD) under the following definition: "Eco-efficiency is achieved by the delivery of competitively priced goods and services that satisfy human needs and bring quality of life, while progressively reducing ecological impacts and resource intensity throughout the life-cycle to a level at least in line with the earth's carrying capacity" (DeSimone and Popoff, 1997: 47). Similar to the eco-efficiency concept but so far less explored is the second criterion for corporate sustainability. Socio-efficiency describes the relation between a firm's value added and its social impact. Whereas, it can be assumed that most corporate impacts on the environment are negative (apart from rare exceptions such as the planting of trees) this is not true for social impacts. These can be either positive (e.g., corporate giving, creation of employment) or negative (e.g. work accidents, human rights abuses). Both eco-efficiency and socio-efficiency are concerned primarily with increasing economic sustainability. In this process they instrumentalize both natural and social capital aiming to benefit from win-win situations. Some point towards eco-effectiveness, socio-effectiveness, sufficiency, and eco-equity as four criteria that need to be met if sustainable development is to be reached [121-130].

Architecture and Construction

In sustainable architecture the recent movements of New Urbanism and New Classical architecture promote a sustainable approach towards construction that appreciates and develops smart growth, architectural tradition and classical design. This in contrast to modernist and International Style architecture, as well as opposing to solitary housing estates and suburban sprawl, with long commuting distances and large ecological footprints. The global design and construction industry is responsible for approximately 39 percent of greenhouse gas emissions. Green building practices that avoid emissions or capture the carbon already present in the environment, allow for reduced footprint of the construction industry, for example, use of hempcrete, cellulose fiber insulation, and landscaping.

Sustainable Development

Sustainable development is the overarching paradigm of the United Nations. The concept of sustainable development was described by the 1987 Bruntland Commission Report as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." There are four dimensions to sustainable development - society, environment, culture and economy - which are intertwined, not separate. Sustainability is a paradigm for thinking about the future in which environmental, societal and economic considerations are balanced in the pursuit of an improved quality of life. For example, a prosperous society relies on a healthy environment to provide food and resources, safe drinking water and clean air for its citizens. One might ask, what is the difference between sustainable development and sustainability? Sustainability is often thought of as a long-term goal (i.e. a more sustainable world), while sustainable development refers to the many processes and pathways to achieve it (e.g. sustainable agriculture and forestry, sustainable production and consumption, good government, research and technology transfer, education and training, etc.).

What are the Sustainable Development Goals?

The Sustainable Development Goals (SDGs), also known as the Global Goals, were adopted by the United Nations in 2015 as a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity. The 17 SDGs are integrated-they recognize that action in one area will affect outcomes in others, and that development must balance social, economic and environmental sustainability. Countries have committed to prioritize progress for those who're furthest behind. The SDGs are designed to end poverty, hunger, AIDS, and discrimination against women and girls. The creativity, knowhow, technology and financial resources from all of society is necessary to achieve the SDGs in every context.

Goal 1

No Poverty

Eradicating poverty in all its forms remains one of the greatest challenges facing humanity. While the number of people living in extreme poverty dropped by more than half between 1990 and 2015, too many are still struggling for the most basic human needs. As of 2015, about 736 million people still lived on less than US$1.90 a day; many lack food, clean drinking water and sanitation. Rapid growth in countries such as China and India has lifted millions out of poverty, but progress has been uneven. Women are more likely to be poor than men because they have less paid work, education, and own less property. Progress has also been limited in other regions, such as South Asia and sub-Saharan Africa, which account for 80 percent of those living in extreme poverty. New threats brought on by climate change, conflict and food insecurity, mean even more work is needed to bring people out of poverty. The SDGs are a bold commitment to finish what we started, and end poverty in all forms and dimensions by 2030. This involves targeting the most vulnerable, increasing basic

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resources and services, and supporting communities affected by conflict and climate-related disasters.

Goal 2

Zero Hunger

Unfortunately, extreme hunger and malnutrition remain a huge barrier to development in many countries. There are 821 million people estimated to be chronically undernourished as of 2017, often as a direct consequence of environmental degradation, drought and biodiversity loss. Over 90 million children under five are dangerously underweight. Undernourishment and severe food insecurity appear to be increasing in almost all regions of Africa, as well as in South America. The SDGs aim to end all forms of hunger and malnutrition by 2030, making sure all people- especially children-have sufficient and nutritious food all year. This involves promoting sustainable agricultural, supporting small-scale farmers and equal access to land, technology and markets. It also requires international cooperation to ensure investment in infrastructure and technology to improve agricultural productivity [131-140].

Goal 3

Good Health and Well-Being

We have made great progress against several leading causes of death and disease. Life expectancy has increased dramatically; infant and maternal mortality rates have declined, we've turned the tide on HIV and malaria deaths have halved. Good health is essential to sustainable development and the 2030 Agenda reflects the complexity and interconnectedness of the two. It takes into account widening economic and social inequalities, rapid urbanization, threats to the climate and the environment, the continuing burden of HIV and other infectious diseases, and emerging challenges such as noncommunicable diseases. Universal health coverage will be integral to achieving SDG, ending poverty and reducing inequalities. Emerging global health priorities not explicitly included in the SDGs, including antimicrobial resistance, also demand action. But the world is off-track to achieve the health-related SDGs. Progress has been uneven, both between and within countries. There's a 31-year gap between the countries with the shortest and longest life expectancies. And while some countries have made impressive gains, national averages hide that many are being left behind. Multisectoral, rights-based and gender-sensitive approaches are essential to address inequalities and to build good health for all.

Goal 4

Quality Education

Since 2000, there has been enormous progress in achieving the target of universal primary education. The total enrollment rate in developing regions reached 91 percent in 2015, and the worldwide number of children out of school has dropped by almost half. There has also been a dramatic increase in literacy rates, and many more girls are in school than ever before. These are all remarkable successes. Since 2000, there has been enormous progress in achieving the target of universal primary education. The total enrollment rate in developing regions reached 91 percent in 2015, and the worldwide number of children out of school has dropped by almost half. There has also been a dramatic increase in literacy rates, and many more girls are in school than ever before. These are all remarkable successes. Progress has also been tough in some developing regions due to high levels of poverty, armed conflicts and other emergencies. In Western Asia and North Africa, ongoing armed conflict has seen an increase in the number of children out of school. This is a worrying trend. While Sub-Saharan Africa made the greatest progress in primary school enrollment among all developing regions - from 52 percent in 1990, up to 78 percent in 2012 - large disparities still remain. Children from the poorest households are up to four times more likely to be out of school than those of the richest households. Disparities between rural and urban areas also remain high. Achieving inclusive and quality education for all reaffirms the belief that education is one of the most powerful and proven vehicles for sustainable development. This goal ensures that all girls and boys complete free primary and secondary schooling by 2030. It also aims to provide equal access to affordable vocational training, to eliminate gender and wealth disparities, and achieve universal access to a quality higher education.

Goal 5

Gender Equality

Ending all discrimination against women and girls is not only a basic human right, it's crucial for sustainable future; it's proven that empowering women and girls helps economic growth and development. UNDP has made gender equality central to its work and we've seen remarkable progress in the past 20 years. There are more girls in school now compared to 15 years ago, and most regions have reached gender parity in primary education. But although there are more women than ever in the labor market, there are still large inequalities in some regions, with women systematically denied the same work rights as men. Sexual violence and exploitation, the unequal division of unpaid care and domestic work, and discrimination in public office all remain huge barriers. Climate change and disasters continue to have a disproportionate effect on women and children, as do conflict and migration. It is vital to give women equal rights land and property, sexual and reproductive health, and to technology and the internet. Today there are more women in public office than ever before, but encouraging more women leaders will help achieve greater gender equality.

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Goal 6

Clean Water and Sanitation

Water scarcity affects more than 40 percent of people, an alarming figure that is projected to rise as temperatures do. Although 2.1 billion people have improved water sanitation since 1990, dwindling drinking water supplies are affecting every continent. More and more countries are experiencing water stress, and increasing drought and desertification is already worsening these trends. By 2050, it is projected that at least one in four people will suffer recurring water shortages. Safe and affordable drinking water for all by 2030 requires we invest in adequate infrastructure, provide sanitation facilities, and encourage hygiene. Protecting and restoring water-related ecosystems is essential. Ensuring universal safe and affordable drinking water involves reaching over 800 million people who lack basic services and improving accessibility and safety of services for over two billion. In 2015, 4.5 billion people lacked safely managed sanitation services (with adequately disposed or treated excreta) and 2.3 billion lacked even basic sanitation.

Goal 7

Affordable and Clean Energy

Between 2000 and 2018, the number of people with electricity increased from 78 to 90 percent, and the numbers without electricity dipped to 789 million. Yet as the population continues to grow, so will the demand for cheap energy, and an economy reliant on fossil fuels is creating drastic changes to our climate. Investing in solar, wind and thermal power, improving energy productivity, and ensuring energy for all is vital if we are to achieve SDG 7 by 2030. Expanding infrastructure and upgrading technology to provide clean and more efficient energy in all countries will encourage growth and help the environment.

Goal 8

Decent Work and Economic Growth

Over the past 25 years the number of workers living in extreme poverty has declined dramatically, despite the lasting impact of the 2008 economic crisis and global recession. In developing countries, the middle class now makes up more than 34 percent of total employment - a number that has almost tripled between 1991 and 2015. However, as the global economy continues to recover we are seeing slower growth, widening inequalities, and not enough jobs to keep up with a growing labor force. According to the International Labor Organization, more than 204 million people were unemployed in 2015. The SDGs promote sustained economic growth, higher levels of productivity and technological innovation. Encouraging entrepreneurship and job creation are key to this, as are effective measures to eradicate forced labor, slavery and human trafficking. With these targets in mind, the goal is to achieve full and productive employment, and decent work, for all women and men by 2030.

Goal 9

Industry, Innovation and Infrastructure

Investment in infrastructure and innovation are crucial drivers of economic growth and development. With over half the world population now living in cities, mass transport and renewable energy are becoming ever more important, as are the growth of new industries and information and communication technologies. Technological progress is also key to finding lasting solutions to both economic and environmental challenges, such as providing new jobs and promoting energy efficiency. Promoting sustainable industries, and investing in scientific research and innovation, are all important ways to facilitate sustainable development. More than 4 billion people still do not have access to the Internet, and 90 percent are from the developing world. Bridging this digital divide is crucial to ensure equal access to information and knowledge, as well as foster innovation and entrepreneurship [141-150].

Goal 10

Reduced Inequalities

Income inequality is on the rise. The richest 10 percent have up to 40 percent of global income whereas the poorest 10 percent earn only between 2 to 7 percent. If we take into account population growth inequality in developing countries, inequality has increased by 11 percent. Income inequality has increased in nearly everywhere in recent decades, but at different speeds. It's the lowest in Europe and highest in the Middle East. These widening disparities require sound policies to empower lower income earners, and promote economic inclusion of all regardless of sex, race or ethnicity. Income inequality requires global solutions. This involves improving the regulation and monitoring of financial markets and institutions, encouraging development assistance and foreign direct investment to regions where the need is greatest. Facilitating the safe migration and mobility of people is also key to bridging the widening divide.

Goal 11

Sustainable Cities and Communities

More than half of us live in cities. By 2050, two-thirds of all humanity -6.5 billion people- will be urban. Sustainable development cannot be achieved without significantly transforming the way we build and manage our urban spaces. The rapid growth of cities -a result of rising populations and increasing migration has led to a boom in mega-cities, especially in the developing world, and slums are becoming a more significant feature of urban life. Making cities sustainable means creating career and business opportunities, safe and affordable housing,

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and building resilient societies and economies. It involves investment in public transport, creating green public spaces, and improving urban planning and management in participatory and inclusive ways.

Goal 12

Responsible Consumption and Production

Achieving economic growth and sustainable development requires that we urgently reduce our ecological footprint by changing the way we produce and consume goods and resources. Agriculture is the biggest user of water worldwide, and irrigation now claims close to 70 percent of all freshwaters for human use. The efficient management of our shared natural resources, and the way we dispose of toxic waste and pollutants, are important targets to achieve this goal. Encouraging industries, businesses and consumers to recycle and reduce waste is equally important, as is supporting developing countries to move towards more sustainable patterns of consumption by 2030. A large share of the world population is still consuming far too little to meet even their basic needs. Halving the per capita of global food waste at the retailer and consumer levels is also important for creating more efficient production and supply chains. This can help with food security and shift us towards a more resource efficient economy.

Goal 13

Climate Action

There is no country that is not experiencing the drastic effects of climate change. Greenhouse gas emissions are more than 50 percent higher than in 1990. Global warming is causing long-lasting changes to our climate system, which threatens irreversible consequences if we do not act. The annual average economic losses from climate-related disasters are in the hundreds of billions of dollars. This is not to mention the human impact of geo-physical disasters, which are 91 percent climate-related, and which between 1998 and 2017 killed 1.3 million people and left 4.4 billion injured. The goal aims to mobilize US$100 billion annually by 2020 to address the needs of developing countries to both adapt to climate change and invest in low-carbon development. Supporting vulnerable regions will directly contribute not only to Goal 13 but also to the other SDGs. These actions must also go hand in hand with efforts to integrate disaster risk measures, sustainable natural resource management, and human security into national development strategies. It is still possible, with strong political will, increased investment, and using existing technology, to limit the increase in global mean temperature to two degrees Celsius above pre-industrial levels, aiming at 1.5°C, but this requires urgent and ambitious collective action.

Goal 14

Life below Water

The world's oceans - their temperature, chemistry, currents and life - drive global systems that make the Earth habitable for humankind. How we manage this vital resource is essential for humanity as a whole, and to counterbalance the effects of climate change. Over three billion people depend on marine and coastal biodiversity for their livelihoods. However, today we are seeing 30 percent of the world's fish stocks overexploited, reaching below the level at which they can produce sustainable yields. Oceans also absorb about 30 percent of the carbon dioxide produced by humans, and we are seeing a 26 percent rise in ocean acidification since the beginning of the industrial revolution. Marine pollution, an overwhelming majority of which comes from land-based sources, is reaching alarming levels, with an average of 13,000 pieces of plastic litter to be found on every square kilometer of ocean. The SDGs aim to sustainably manage and protect marine and coastal ecosystems from pollution, as well as address the impacts of ocean acidification. Enhancing conservation and the sustainable use of ocean-based resources through international law will also help mitigate some of the challenges facing our oceans.

Goal 15

Life on Land

Human life depends on the earth as much as the ocean for our sustenance and livelihoods. Plant life provides 80 percent of the human diet, and we rely on agriculture as an important economic resources. Forests cover 30 percent of the Earth's surface, provide vital habitats for millions of species, and important sources for clean air and water, as well as being crucial for combating climate change. Every year, 13 million hectares of forests are lost, while the persistent degradation of dry lands has led to the desertification of 3.6 billion hectares, disproportionately affecting poor communities. While 15 percent of land is protected, biodiversity is still at risk. Nearly 7,000 species of animals and plants have been illegally traded. Wildlife trafficking not only erodes biodiversity, but creates insecurity, fuels conflict, and feeds corruption. Urgent action must be taken to reduce the loss of natural habitats and biodiversity which are part of our common heritage and support global food and water security, climate change mitigation and adaptation, and peace and security.

Goal 16

Peace, Justice and Strong Institutions

We cannot hope for sustainable development without peace, stability, human rights and effective governance, based on the rule of law. Yet our world is increasingly divided. Some regions enjoy peace, security and prosperity, while others fall into seemingly endless cycles of conflict and violence. This is not inevitable and must be addressed. Armed violence and insecurity have a destructive impact on a country's development, affecting economic growth, and often resulting in grievances that last for generations. Sexual violence, crime, exploitation and torture are also prevalent where there is conflict, or no rule of law, and

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countries must take measures to protect those who are most at risk The SDGs aim to significantly reduce all forms of violence, and work with governments and communities to end conflict and insecurity. Promoting the rule of law and human rights are key to this process, as is reducing the flow of illicit arms and strengthening the participation of developing countries in the institutions of global governance.

Goal 17

Partnerships for the Goals

The SDGs can only be realized with strong global partnerships and cooperation. Official Development Assistance remained steady but below target, at US$147 billion in 2017. While humanitarian crises brought on by conflict or natural disasters continue to demand more financial resources and aid. Many countries also require Official Development Assistance to encourage growth and trade. The world is more interconnected than ever. Improving access to technology and knowledge is an important way to share ideas and foster innovation. Coordinating policies to help developing countries manage their debt, as well as promoting investment for the least developed, is vital for sustainable growth and development. The goals aim to enhance North-South and South-South cooperation by supporting national plans to achieve all the targets. Promoting international trade and helping developing countries increase their exports is all part of achieving a universal rules-based and equitable trading system that is fair and open and benefits all.

What is the importance of sustainable development?

Global goals, such as the Sustainable Development Goals or SDGs, mobilize the global community to achieve them because a specific time frame is defined for these goals. These goals cause the cooperation of stakeholders from different countries and promote innovation and the sharing of expertise and new methods. An example of the effects of these collaborations and mobilizing global resources are achievements in the field of health: reducing child mortality and universal access to health. The Sustainable Development Goals provide a long-term approach to addressing global challenges. The challenges facing many countries of the world and to solve them requires joint cooperation. Due to rapid changes in governments and their policies, most government programs have a relatively short lifespan (4-5 years). Having long-term goals and plans that have been agreed upon by 193 countries will increase the continuity of efforts towards these goals and will strengthen the commitment to accomplish them. Sustainable development goals not only refer to people's well-being, economic development of countries and a better environment, but also provide the tools needed to achieve them and how to make these changes. These goals address the root causes of poverty and inequality. Problems such as weak rule of law, corruption, traditionalism and norms that cause discrimination. Since all these goals are interrelated, without knowing the root causes of one, the other cannot be achieved.

Renewability and Sustainability

Geothermal power is considered to be renewable because any projected heat extraction is small compared to the Earth's heat content. The Earth has an internal heat content of 1031 joules (3·1015 TWh), approximately 100 billion times the 2010 worldwide annual energy consumption. About 20% of this is residual heat from planetary accretion; the remainder is attributed to past and current radioactive decay of naturally occurring isotopes. For example, a 5275 m deep borehole in United Downs Deep Geothermal Power Project in Cornwall, England, found granite with very high thorium content, whose radioactive decay is believed to power the high temperature of the rock. Natural heat flows are not in equilibrium, and the planet is slowly cooling down on geologic timescales. Human extraction taps a minute fraction of the natural outflow, often without accelerating it. According to most official descriptions of geothermal energy use, it is currently called renewable and sustainable because it returns an equal volume of water to the area that the heat extraction takes place, but at a somewhat lower temperature. For instance, the water leaving the ground is 300 degrees, and the water returning is 200 degrees, the energy obtained is the difference in heat that is extracted. Current research estimates of impact on the heat loss from the Earth's core are based on a studies done up through 2012. However, if household and industrial uses of this energy source were to expand dramatically over coming years, based on a diminishing fossil fuel supply and a growing world population that is rapidly industrializing requiring additional energy sources, then the estimates on the impact on the Earth's cooling rate would need to be re-evaluated [151-160].

Geothermal power is also considered to be sustainable thanks to its power to sustain the Earth's intricate ecosystems. By using geothermal sources of energy present generations of humans will not endanger the capability of future generations to use their own resources to the same amount that those energy sources are presently used. Further, due to its low emissions geothermal energy is considered to have excellent potential for mitigation of global warming. Even though geothermal power is globally sustainable, extraction must still be monitored to avoid local depletion. Over the course of decades, individual wells draw down local temperatures and water levels until a new equilibrium is reached with natural flows. The three oldest sites, at Larderello, Wairakei, and Geysers have experienced reduced output because of local depletion. Heat and water, in uncertain proportions, were extracted faster than they were replenished. If production is reduced and water is reinjected, these wells could theoretically recover their full potential. Such mitigation strategies have already been implemented at some sites. The long-term sustainability of geothermal energy has been demonstrated at the Lardarello field in Italy since 1913, at the Wairakei field in New Zealand since 1958, and at The Geysers field in California since 1960.

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Falling electricity production may be boosted through drilling additional supply boreholes, as at Poihipi and Ohaaki. The Wairakei power station has been running much longer, with its first unit commissioned in November 1958, and it attained its peak generation of 173 MW in 1965, but already the supply of high-pressure steam was faltering, in 1982 being derated to intermediate pressure and the station managing 157 MW. Around the start of the 21st century it was managing about 150 MW, then in 2005 two 8 MW isopentane systems were added, boosting the station's output by about 14 MW. Detailed data are unavailable, being lost due to re-organisations. One such re-organisation in 1996 causes the absence of early data for Poihipi (started 1996), and the gap in 1996/7 for Wairakei and Ohaaki; half-hourly data for Ohaaki's first few months of operation are also missing, as well as for most of Wairakei's history.

Sustainable Development

Sustainable development is an organizing principle for meeting human development goals while also sustaining the ability of natural systems to provide the natural resources and ecosystem services on which the economy and society depend. The desired result is a state of society where living conditions and resources are used to continue to meet human needs without undermining the integrity and stability of the natural system. Sustainable development can be defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs. While the modern concept of sustainable development is derived mostly from the 1987 Brundtland Report, it is also rooted in earlier ideas about sustainable forest management and 20th-century environmental concerns. As the concept of sustainable development developed, it has shifted its focus more towards economic development, social development and environmental protection for future generations. The UN-level Sustainable Development Goals (2015-2030) address global challenges, including poverty, inequality, climate change, environmental degradation, peace, and justice.

Definition

Sustainable development can be defined as the practice of maintaining productivity by replacing used resources with resources of equal or greater value without degrading or endangering natural biotic systems. Sustainable development binds together concern for the carrying capacity of natural systems with the social, political and economic challenges faced by humanity. Sustainability science is the study of the concepts of sustainable development and environmental science. There is an emphasis on the present generations' responsibility to regenerate, maintain and improve planetary resources for use by future generations.

Development of the Concept

Origins

Sustainable development has its roots in ideas about sustainable forest management, which were developed in Europe during the 17th and 18th centuries. In response to a growing awareness of the depletion of timber resources in England, John Evelyn argued, in his 1662 essay Sylva that "sowing and planting of trees had to be regarded as a national duty of every landowner, in order to stop the destructive over-exploitation of natural resources." In 1713, Hans Carl von Carlowitz, a senior mining administrator in the service of Elector Frederick Augustus I of Saxony published Sylvicultura economics, a 400-page work on forestry. Building upon the ideas of Evelyn and French minister Jean-Baptiste Colbert, von Carlowitz developed the concept of managing forests for sustained yield. His work influenced others, including Alexander von Humboldt and Georg Ludwig Hartig, eventually leading to the development of the science of forestry. This, in turn, influenced people like Gifford Pinchot, the first head of the US Forest Service, whose approach to forest management was driven by the idea of wise use of resources, and Aldo Leopold whose land ethic was influential in the development of the environmental movement in the 1960s.

Following the publication of Rachel Carson's Silent Spring in 1962, the developing environmental movement drew attention to the relationship between economic growth and environmental degradation. Kenneth E. Boulding, in his influential 1966 essay The Economics of the Coming Spaceship Earth, identified the need for the economic system to fit itself to the ecological system with its limited pools of resources. Another milestone was the 1968 article by Garrett Hardin that popularized the term "tragedy of the commons". One of the first uses of the term sustainable in the contemporary sense was by the Club of Rome in 1972 in its classic report on the Limits to Growth, written by a group of scientists led by Dennis and Donella Meadows of the Massachusetts Institute of Technology. Describing the desirable "state of global equilibrium", the authors wrote: "We are searching for a model output that represents a world system that is sustainable without sudden and uncontrolled collapse and capable of satisfying the basic material requirements of all of its people."

In 1980, the International Union for Conservation of Nature published a world conservation strategy that included one of the first references to sustainable development as a global priority and introduced the term "sustainable development". Two years later, the United Nations World Charter for Nature raised five principles of conservation by which human conduct affecting nature is to be guided and judged. In 1987, the United Nations World Commission on Environment and Development released the report Our Common Future, commonly called the Brundtland Report. The report included what is now one of the most widely recognized definitions of sustainable development. Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains Within it two key concepts: The concept of 'needs', in particular, the essential needs of the world's poor, to which overriding priority should be given; and The idea

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of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs.

Since the Brundtland Report, the concept of sustainable development has developed beyond the initial intergenerational framework to focus more on the goal of "socially inclusive and environmentally sustainable economic growth". In 1992, the UN Conference on Environment and Development published the Earth Charter, which outlines the building of a just, sustainable, and peaceful global society in the 21st century. The action plan Agenda 21 for sustainable development identified information, integration, and participation as key building blocks to help countries achieve development that recognizes these interdependent pillars. It emphasizes that in sustainable development, everyone is a user and provider of information. It stresses the need to change from old sector-centered ways of doing business to new approaches that involve cross-sectoral co-ordination and the integration of environmental and social concerns into all development processes. Furthermore, Agenda 21 emphasizes that broad public participation in decision making is a fundamental prerequisite for achieving sustainable development.

Under the principles of the United Nations Charter the Millennium Declaration identified principles and treaties on sustainable development, including economic development, social development and environmental protection. Broadly defined, sustainable development is a systems approach to growth and development and to manage natural, produced, and social capital for the welfare of their own and future generations. The term sustainable development as used by the United Nations incorporates both issues associated with land development and broader issues of human development such as education, public health, and standard of living. A 2013 study concluded that sustainability reporting should be reframed through the lens of four interconnected domains: ecology, economics, politics and culture.

Reception

The concept of sustainable development has been, and still is, subject to criticism, including the question of what is to be sustained in sustainable development. It has been argued that there is no such thing as a sustainable use of a non-renewable resource, since any positive rate of exploitation will eventually lead to the exhaustion of earth's finite stock; this perspective renders the Industrial Revolution as a whole unsustainable. The sustainable development debate is based on the assumption that societies need to manage three types of capital (economic, social, and natural), which may be non-substitutable and whose consumption might be irreversible. Leading ecological economist and steady-state theorist Herman Daly, for example, points to the fact that natural capital can not necessarily be substituted by economic capital. While it is possible that we can find ways to replace some natural resources, it is much more unlikely that they will ever be able to replace eco-system services, such as the protection provided by the ozone layer, or the climate stabilizing function of the Amazonian forest. In fact natural capital, social capital and economic capital are often complementarities. A further obstacle to substitutability lies also in the multi-functionality of many natural resources. Forests, for example, not only provide the raw material for paper but they also maintain biodiversity, regulate water flow, and absorb CO_2.

Requirements

Six interdependent capacities are deemed to be necessary for the successful pursuit of sustainable development. These are the capacities to measure progress towards sustainable development; promote equity within and between generations; adapt to shocks and surprises; transform the system onto more sustainable development pathways; link knowledge with action for sustainability; and to devise governance arrangements that allow people to work together in exercising the other capacities.

Dimensions

Sustainable development can be thought of in terms of three spheres, dimensions, domains or pillars: the environment, the economy and society. The three-sphere framework has also been worded as "economic, environmental and social" or "ecology, economy and equity". This has been expanded by some authors to include a fourth pillar of culture, institutions or governance, or alternatively reconfigured as four domains of the social - ecology, economics, politics and culture, thus bringing economics back inside the social, and treating ecology as the intersection of the social and the natural.

Sustainable Development Goals

The Sustainable Development Goals (SDGs) or Global Goals are a collection of 17 interlinked global goals designed to be a "blueprint to achieve a better and more sustainable future for all". The SDGs were set up in 2015 by the United Nations General Assembly (UN-GA) and are intended to be achieved by the year 2030. They are included in a UN-GA Resolution called the 2030 Agenda or what is colloquially known as Agenda 2030. The SDGs were developed in the Post-2015 Development Agenda as the future global development framework to succeed the Millennium Development Goals which ended in 2015.

What is development?

You might have listed some of the following words: change, consumption, economic development, economic growth, education, entitlements, equality, equity, freedom, gender equity, goals, good governance, Gross Domestic Product (GDP), health, human development, human rights, income, justice, livelihoods,

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Millennium Development Goals (MDGs), participation, peace, positive change, poverty reduction, process of change, production, progress, reducing vulnerability, responsibilities, self-determination, social development, social inclusion, sustainability, targets, wealth [161-170].

Development - A Political Term

A multitude of meanings is attached to the idea of development; the term is complex, contested, ambiguous, and elusive. However, in the simplest terms, development can be defined as bringing about social change that allows people to achieve their human potential. An important point to emphasize is that development is a political term: it has a range of meanings that depend on the context in which the term is used, and it may also be used to reflect and to justify a variety of different agendas held by different people or organizations. The idea of development articulated by the World Bank, for instance, is very different from that promoted by Greenpeace activists. This point has important implications for the task of understanding sustainable development, because much of the confusion about the meaning of the term 'sustainable development' arises because people hold very different ideas about the meaning of 'development' (Adams 2009). Another important point is that development is a process rather than an outcome: it is dynamic in that it involves a change from one state or condition to another. Ideally, such a change is a positive one - an improvement of some sort (for instance, an improvement in maternal health). Furthermore, development is often regarded as something that is done by one group (such as a development agency) to another (such as rural farmers in a developing country). Again, this demonstrates that development is a political process, because it raises questions about who has the power to do what to whom.

Development Transforms the Environment

But development is not simply about the interactions between human groups; it also involves the natural environment. So, from another point of view, development is about the conversion of natural resources into cultural resources. This conversion has taken place throughout the history of human societies, although the process has generally increased in pace and complexity with time. If we use a system diagram to illustrate - in very general terms - what an economy does, we see that the basic function of an economy is to convert natural resources (in the forms of raw materials and energy) into products and services that are useful to humans. Inevitably, because conversion processes are never totally efficient, some waste is produced which is usually discarded into the environment as various forms of pollution. Therefore, the environment is both a source and a sink in relation to economic processes: it is a source of raw materials and energy and a sink for pollution.

Resources, Energy, and Waste

An example of this type of conversion would be the extraction of crude oil from the North Sea, its fractionation and distillation in oil refineries, and its conversion to petroleum or diesel. In turn, those products (petrol and diesel) are converted - through combustion processes - into useful work (such as transportation) whilst the waste products are released into the atmosphere as greenhouse gases (such as carbon dioxide). If we add together all of the conversion processes that occur, for instance, in a given country, we would have a sense of the total input and output of that national economy. This could be expressed in terms of the total natural resources and energy consumed, the total products and services created and the total pollution generated. (In fact, the total value of the finished products and services created in a given country is expressed using a widely-used measure, the Gross Domestic Product, or GDP.) If we wanted to increase the creation of products and services, in a given economy, we would require more natural resources and energy, and we would also generate more pollution as a by-product.

Economic Growth

From this point of view, development means an increase in the size or pace of the economy such that more products and services are produced. Conventionally, a common assumption has been that, if an economy generates more products and services, then humans will enjoy a higher standard of living. The aim of many conventional approaches to development has been to increase the size of the economy (economic growth) in order to increase the output of products and services. Of course, without any change in the fundamental economic processes involved, the production of more products and services will inevitably require more raw materials and energy, and will generate more waste.

Development Theory

The Emergence of Development Theory

The use of the term development to refer to national economic growth emerged in the United States beginning in the 1940s and in association with a key American foreign policy concern: how to shape the future of the newly independent states in ways that would ensure that they would not be drawn into the communist Soviet bloc. Motivated by this concern, the United States enlisted its social scientists to study and devise ways of promoting capitalist economic development and political stability in what was termed the developing world. Development theory refers to the research and writing that resulted from this effort.

There are different conceptions of development and, consequently, disparate approaches to the subject. However, all approaches are concerned with the relationship between

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development and governance. Development is usually seen as crucially determined by structures of governance; governance is interpreted through and shaped by the goal of development. Most development theory equates development with national economic growth and sees the state as its primary agent; consequently, one of its central concerns is to understand and explain the role of the state in development and the nature of government-market relations. Because these explanations relate development outcomes to the extent and form of the state's role in development, there is a close relationship between development theory and practice.

Development theory has changed over time with changes in ideology and the international environment, and, as it changes, so do its conceptions of development and governance and how they are related. Changing conceptions of governance and its relation to development can be traced through the major perspectives on development that have emerged since World War II, as represented by theories of modernization and growth, dependency and world systems theories, the resurgence of neoclassical theory, and an array of newer critical perspectives.

Theories of Modernization and Growth

Development involves innumerable variables, including economic, social, political, gender, cultural, religious, and environmental factors. But though development theory integrates concepts and perspectives from a range of disciplines, it was highly influenced by economic thought from the start. Early theoretical models of development equated development with economic growth and industrialization, and theorists saw countries that had not yet achieved these as being at an earlier or lower stage of development relative to Europe and North America. The most influential proponent of this view was the American economic historian Walt W. Rostow. His 1960 book, The Stages of Economic Growth: A Non-Communist Manifesto, elaborated a linear-stages-of-growth model that defined development as a sequence of stages through which all societies must pass. This conception of the nature and process of development became the basic blueprint for modernization theory. This perspective formed the basis of what came to be known as dependency theory. Dependency theory rejects the limited national focus of modernization theory and emphasizes the importance of understanding the complexity of imperialism and its role in shaping postcolonial states. Its main tenet is that the periphery of the international economy is being economically exploited (drained) by the center. Building on ECLA's perspective, dependency theorists argued that colonialism recast economies in the Third World in a highly specialized export-producing mold, creating fundamental and interrelated structural distortions that have continued to thwart development. Once this reshaping was accomplished, market forces worked to perpetuate the relationship of dominance and exploitation between center and periphery.

During the 1970s there also emerged a perspective that elaborated an account of capitalist exploitation of the periphery from the perspective of the system's core. This theoretical enterprise became known as world systems theory. It typically treats the entire world, at least since the 16th century, as a single capitalist world economy based on an international division of labor among a core that developed originally in northwestern Europe (England, France, Netherlands), a periphery, and a semi periphery consisting of core regions in decline (e.g., Portugal and Spain) or peripheries attempting to improve their relative position in the world economy (e.g., Italy, southern Germany, and southern France). The division of labor among these regions determined their relationship to each other as well as their type of labor conditions and political system. In the core, strong central governments, extensive bureaucracies, and large mercenary armies enabled the local bourgeoisies to obtain control of international commerce and accumulate capital surpluses from this trade. The periphery, which lacked strong central governments or was controlled by other states, exported raw materials to the core and relied on coercive labor practices. Much of the capital surplus generated by the periphery was expropriated by the core through unequal trade relations. The semi periphery had limited access to international banking and the production of high-cost, high-quality manufactured goods but did not benefit from international trade to the same extent as the core.

Dependency and world systems theories share a common emphasis on global analysis and similar assumptions about the nature of the international system and its impact on national development in different parts of the world, but they tend to emphasize different political dynamics. Dependency theorists tend to focus on the power of transnational classes and class structures in sustaining the global economy, whereas world systems analysts tended to focus on the role of powerful states and the interstate system. Initially, the logic of these perspectives supported a strategy that came to be known as import-substitution industrialization (ISI). The ISI strategy was to produce internally manufactured goods for the national market instead of importing them from industrialized countries. Its long-run objective was to first achieve greater domestic industrial diversification and then to export previously protected manufactured goods as economies of scale and low labor costs make domestic costs more competitive in the world market. In the 1950s, 1960s, and 1970s, ISI strategies were pursued by countries such as Chile, Peru, Brazil, Mexico, Argentina, Ecuador, India, Pakistan, the Philippines, Indonesia, Nigeria, Ethiopia, Ghana, Zambia, South Korea, Taiwan, and Japan. The strategy ultimately foundered because of the smallness of the domestic market and, according to many structuralist theorists, the role of transnational corporations in this system. These theorists concluded that ISI, carried out in conditions of capitalist relations of production dominated by the economic empires led by the United States, was a recipe for further colonization,

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domination, and dependency.

Thus, beginning in the 1970s, theorists and practitioners heralded an export-oriented strategy as the way out of dependency. This strategy gives priority to the growth of manufacturing production aimed at world markets and the development of a particular comparative advantage as a basis for success in world trade. The strategy is based on lower wages and levels of domestic consumption (at least initially) to foster competitiveness in world markets, as well as to provide better conditions for foreign investment and foreign financing of domestic investment. By the 1980s, however, many countries that pursued this strategy ended up with huge foreign indebtedness, causing a dramatic decrease in economic growth. Though the theorization of types of peripheral development and their connection with the international system continued to undergo refinement in the 1980s and 1990s, structural theorists were not able to agree about what would end dependence and how a nondependent growth could be achieved.

The Neoclassical Counterrevolution

In the 1980s a neoclassical (sometimes called neoliberal) counterrevolution in development theory and policy reasserted dominance over structuralist and other schools of thought in much of the world. The emergence of this counterrevolution coincided with the abandonment by the developed countries of social democratic and Keynesian economic policies and, in particular, the policy of controlling capital movements, as well as the post-World War II trading regime. Critics have pointed out that this counterrevolution also coincided with and seemed to offer justification and support for a wave of market-oriented interventions by the World Bank and International Monetary Fund (IMF) and efforts to forge a unified global market regulated only by institutions reflecting the interests of transnational capital. The neoclassical or neoliberal perspective represents a modification and further elaboration of modernization theory. However, in contrast to modernization theory, neoclassical theorists see development as the outcome not of strategic state action but of the action of market forces. The central claim is that failure to develop is primarily the result of too much government intervention and regulation of the economy. Neoclassical theory emphasizes the beneficial role of free markets, open economies, and the privatization of inefficient public enterprises. Its recommended strategy for development is to free markets from state control and regulation, so that capital, goods, and services can have total freedom of movement and there can be greater openness to international trade.

This is the basic blueprint for what has been termed good governance. The notion of good governance has been elaborated, in part, through a component of the neoclassical counterrevolution called new institutionalism. The basic premise of this perspective is that development outcomes depend on institutions such as property rights, price and market structures, money and financial institutions, firms and industrial organizations, and relationships between government and markets. The essence of good governance is to ensure the existence of these institutions and their proper role and functioning, as seen from the perspective of neoliberal theory. According to neoliberal thought, good governance requires freeing the market from state control and regulation; reducing government expenditures for social services like education and health care; maintaining roads, bridges, the water supply, and so forth; and selling state-owned enterprises, goods, and services (including banks, key industries, railroads, toll highways, electricity, schools, and hospitals) to private investors. As evidence of the soundness of these policy prescriptions for the developing world, proponents point to the experience of four "Asian tigers": South Korea, Taiwan, Singapore, and Hong Kong. These were the most successful cases of the export-led industrialization strategy adopted by many countries in the 1970s. All were able to achieve economic growth based on export industries with a comparative advantage in cheap but skilled labor. All maintained high rates of domestic savings and investment (with correspondingly lower levels of consumption). However, many people point out that, in contradiction to the market-oriented reforms prescribed by neoliberal theory and its underlying rejection of state intervention, this national development strategy in all the tigers except Hong Kong was planned and executed through the institutions of a centralized authoritarian state.

Critical Perspectives

A number of critical perspectives emerged in the 1970s that highlighted the cultural and ethical dimensions of development. Most prominent among these were the postmodern, postcolonial, and subaltern critiques of Eurocentric conceptions of modernity and development. Postmodern writing challenged grand narratives of the modern era-narratives of the inevitability of progress, the triumph of individuality, and the primacy of scientific truth-as oversimplified, oppressive, or tyrannical. Postcolonial theory focused on the legacy of colonial rule and especially the difficulties faced by former colonial peoples in developing national identity. Working within this general perspective, subaltern studies sought to rethink history from the perspective of the subaltern and, in this way, bring to light and assert the value of alternative experiences and ways.

These critiques succeeded in drawing attention to the ethnocentric basis of the idea of what constitutes development and the potential limitations inherent within this development, the tension between universal theories and a diverse developing world, the treatment of gender in conventional development theory, and the political content of economic development strategies as pursued by national governments, encouraged by international institutions and nongovernmental organizations

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(NGOs), and concealed behind the notion of aid. Eventually, these critiques helped focus attention on the need to broaden the concept of development to include a social development and human security dimension. One notable result has been the United Nations Development Program's conceptualization of human development, which includes the capacity of people to lead long and healthy lives, acquire knowledge, and have access to the resources needed for a decent standard of living.

The notion of human development influenced development theory in at least two ways. First, it clarified the inadequacy of theories that focus on whole nations or societies and that use macroeconomic factors to explain differences in development conditions and to measure development: these theories cannot predict whether the wealth and material well-being generated nationally are widely enough distributed to provide the conditions for human development. Second, the notion of development as human development reemphasizes the importance of the state. It assigns the state a major role in protecting and advancing sustainable human well-being and argues the need for just the socially oriented state policies that neoliberalism proscribes-policies that improve the access of all people to human resource investments, productive assets, credit facilities, information flows, and physical infrastructure and protect the legitimate interests of producers, consumers, workers, and vulnerable groups in society. Thus, alongside the neoliberal call to dismantle public ownership, state planning, and government regulation of economic activities, there was a perspective that reinvigorated the call for a larger state role in development. These contending perspectives informed political debates about growth and governance and, in particular, what constituted good governance in the global context of development.

Developed Country

A developed country (or industrialized country, high-income country, more economically developed country (MEDC), advanced country) is a sovereign state that has a high quality of life, developed economy and advanced technological infrastructure relative to other less industrialized nations. Most commonly, the criteria for evaluating the degree of economic development are gross domestic product (GDP), gross national product (GNP), the per capita income, level of industrialization, amount of widespread infrastructure and general standard of living. Which criteria are to be used and which countries can be classified as being developed are subjects of debate. A point of reference of US$20,000 in 2021 USD nominal GDP per capita for the International Monetary Fund (IMF) is a good point of departure, it is a similar level of development to the United States in 1960. Developed countries have generally more advanced post-industrial economies, meaning the service sector provides more wealth than the industrial sector. They are contrasted with developing countries, which are in the process of industrialization or are pre-industrial and almost entirely agrarian, some of which might fall into the category of Least Developed Countries. As of 2015, advanced economies comprise 60.8% of global GDP based on nominal values and 42.9% of global GDP based on purchasing-power parity (PPP) according to the IMF.

Definition and Criteria

Economic criteria have tended to dominate discussions. One such criterion is income per capita; countries with high gross domestic product (GDP) per capita would thus be described as developed countries. Another economic criterion is industrialization; countries in which the tertiary and quaternary sectors of industry dominate would thus be described as developed. More recently another measure, the Human Development Index (HDI), which combines an economic measure, national income, with other measures, indices for life expectancy and education has become prominent. This criterion would define developed countries as those with a very high (HDI) rating. The index, however, does not take into account several factors, such as the net wealth per capita or the relative quality of goods in a country. This situation tends to lower the ranking for some of the most advanced countries, such as the G7 members and others.

It's difficult to determine how best to quantify the difference between developed and developing countries. Although gross domestic product (GDP) is one of the most well-known values for assessing economic health, several other metrics can also be used to gauge a nation's development. While some have the potential to be more accurate than others, none of them are inherently wrong to use. To further complicate matters, most countries are large, complex entities that can't be neatly categorized. As a result, there are several nations that exhibit characteristics of more than one category. Even the experts have yet to agree on a consistent definition. For instance, the United Nations (UN) classifies countries as either developed economies, economies in transition, or developing economies, although it doesn't specify its basis for applying these groupings other than that they "reflect basic economic country conditions." The International Monetary Fund (IMF), on the other hand, takes several different factors into account when determining whether a nation is an advanced economy, an emerging market and developing economy, or a low-income developing country. The World Bank uses gross national income (GNI) per capita for its measurements, and it has four different categories: high-income economies, upper middle-income economies, lower middle-income economies, and low-income economies. The purpose of this article is to highlight the development status of the 25 largest countries on Earth by GDP. This metric was chosen to better illustrate how nations meeting the traditional criteria for being "wealthy" can still be considered developing. That being said, countries on this list have been categorized according to the UN's standards because its classification system is the closest to our definitions of "developed" and "developing."

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What Is a Developed Nation?

A nation is typically considered to be "developed" if it meets certain socioeconomic criteria. In some cases, this can be as simple as having a sufficiently developed economy. Where that isn't adequate, other qualifiers can include but are not limited to a country's GDP/GNI per capita, its level of industrialization, its general standard of living, and/or the amount of technological infrastructure it has. These factors are typically interconnected (i.e., the level of available technology can impact the amount of GDP a country is capable of generating, etc.). According to the UN, in 2020, 35 countries were considered "developed." All developed countries were located in either North America, Europe, or "Developed Asia and Pacific."

Developed countries typically share several other characteristics:

- Their birth and death rates are stable. They do not have very high birth rates because, thanks to quality medical care and high living standards, infant mortality rates are low. Families do not feel the need to have large numbers of children due to the expectation that some will not survive.

- They have more women working. These career-oriented women may have chosen to have smaller families or eschew having children altogether.

- They use a disproportionate amount of the world's resources. In developed countries, more people drive cars, fly on airplanes, and power their homes with electricity and gas. Inhabitants of developing countries often do not have access to technologies that require the use of these resources.

- They have higher levels of debt. Nations with developing economies cannot obtain the kind of seemingly bottomless financing that more developed nations can.

What Is a Developing Country?

A nation is typically considered to still be "developing" if it does not meet the socioeconomic criteria listed above. Simply put, these are most often countries with a lower income, an underdeveloped industrial base, a lower standard of living, and a lack of access to modern technology. As a result, developing nations frequently experience a lack of jobs, food, clean drinking water, education, healthcare, and housing. According to the UN, in 2020, 126 countries were considered "developing." All developing countries were located in either Africa, Asia, or Latin America and the Caribbean. Development status determines which countries have a right to receive development aid under the rules of a multilateral or bilateral agency, such as the World Trade Organization (WTO). This is likely the primary reason for why there are so many varied definitions of "developed" vs. "developing," as each organization has different qualifications for what should constitute the latter in order to receive their assistance. This is also why even the terminology is inconsistent, as this binary is often insufficient for categorizing large, complex territories. For instance, the World Bank announced in 2016 that it would no longer be distinguishing between developing countries and developed countries, due to the terms no longer being considered relevant.

Which Countries Have the Highest GDP per Capita?

GDP represents the total monetary or market value of all the finished goods and services produced within a country's borders in a specific time period. The calculation of a nation's GDP encompasses all private and public consumption, government outlays, investments, additions to private inventories, paid-in construction costs, and the foreign balance of trade. While useful for acquiring a snapshot of the world's economic powerhouses, this metric by itself is typically insufficient. Every country is obviously going to have a different population, which means that looking exclusively at GDP can distort the truth and/or be so obvious as to be meaningless. Of course a nation as large as China, with a total population of 1.4 billion people, would have a larger GDP than a much smaller country like Ireland, with its total population of 4.9 million. GDP per capita is a much more relevant statistic for better illustrating how a hypothetical average citizen might experience a nation's economic output. GDP per capita, a tally of all the goods and services produced in a country in one year (as expressed in U.S. dollars), is a useful metric for distinguishing developed countries from developing ones. GDP per capita is calculated by dividing a country's GDP by its total population. For example, the population of China is approximately 285 times larger than the population of Ireland. Yet the typical Irish person ($78,779) is nearly eight times richer than their Chinese counterpart ($10,216.60), despite the fact that their country is so much smaller. The countries with the highest GDP per capita are often those with an unusual concentration of wealth.

What Does HDI Mean?

Another measuring device, the human development index (HDI), was developed by the UN as a metric to assess the social and economic development levels of a given country. HDI quantifies life expectancy, educational attainment, and income into a standardized number between zero and one; the closer to one, the more developed the country. No minimum requirement exists for developed status, but most developed countries have HDIs of 0.8 or higher. The life expectancy aspect of the HDI is calculated at the time of birth, which is equal to zero when life expectancy is 20 and equal to one when life expectancy is 85. Education is measured according to the mean years of schooling for residents of a country and the expected years of schooling that a child has at the average age for starting school. Finally, the metric chosen to represent the standard of living is GNI (gross national income) per capita based on purchasing power parity (PPP). This index is useful for examining the impact of policy choices made by each nation. For example, if two countries have approximately the same GNI per capita but wildly different HDI scores, then it stands to reason that these disparities could stem from policies regarding

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life expectancy, educational attainment, or another factor unrelated to economic health. It's important to remember no set minimums or maximums exist for these metrics. Economists look at the totality of a country's situation before rendering judgment, and they do not always agree on a country's development status.

Development Status of the Top 25 Countries by GDP

Here is our analysis of the development status of the top 25 countries by GDP as of 2019, organized alphabetically. Of this total, 14 countries are considered "developed," 10 are considered "developing," and one is considered "in transition."

Australia

- GDP (2019): $1,396.57 billion
- Population (2019): 25.36 million
- GDP per Capita (2019): $55,057.2
- HDI (2020): 0.944

Australia is a developed country. The Land Down Under has widespread industrialization and provides quality healthcare for the majority of its citizens. Australians also enjoy a higher quality of life than some other countries; according to the Organization for Economic Cooperation and Development (OECD), citizens on average graded their contentment with life as 7.3 out of 10, which is reasonably better that the 6.5 global average. Australia is one of the wealthiest Asia-Pacific nations and has enjoyed over 20 years of economic growth. Australia has a high average life expectancy of 85 years, much of which can be attributed to its excellent healthcare system. The country's infant mortality rate is three per 1,000 live births, one of the lowest rates in the world, as of 2019.

Belgium

- GDP (2019): $533.10 billion
- Population (2019): 11.50 million
- GDP per Capita (2019): $46,345.4
- HDI (2020): 0.931

Belgium is a developed country. The Kingdom of Belgium is the first among several European countries on this list to have a higher quality of life (6.9 out of 10), life expectancy (81.6 years from birth), and education length (19.8 years of schooling) than the respective worldwide averages. At 69.74%, the services sector accounted for the largest portion of the country's GDP in 2019. Belgium lacks an abundance of natural resources, making it heavily reliant on imports of raw materials. However, given its central geographic location, highly developed transport network, and diversified industrial and commercial base, the country is well suited to act as a major exporter of manufactured goods. As of 2019, the country's average life expectancy was 82 years from birth, while its infant mortality rate was 10 deaths per 1,000 live births.

Brazil

- GDP (2019): $1,839.76 billion
- Population (2019): 211.05 million
- GDP per Capita (2019): $8,717.2
- HDI (2020): 0.765

Brazil is a developing country. Though it has several characteristics of a developed nation, including the largest economy in South America or Central America, Brazil is still considered a developing country due to its lower GDP per capita, higher infant mortality rate, and other factors. Its high birth rate, at 14 births per 1,000 people in 2019, is also a common characteristic of a developing country. Several factors contribute to all of these metrics, including lack of clean water; limited access to adequate healthcare, particularly in rural areas; abysmal housing conditions in many regions; and substandard diets. A Brazilian's average life expectancy, at 76 years since birth as of 2019, ranks higher than that of some other developing countries, though it's just barely above the global average of 75 years.

Canada

- GDP (2019): $1,736.42 billion
- Population (2019): 37.59 million
- GDP per Capita (2019): $46,189.7
- HDI (2020): 0.929

Canada is a developed country. As the 10th-largest world economy on the basis of GDP, Canada has a diverse economic base. It has a wealth of natural resources, including oil, gas, and coal. As such, the country is able to support its own energy needs as well as export natural resources to other countries. In spite of this fact, Canada is also a world leader in the production and use of renewable energy sources, which provide approximately 18.9% of the country's overall energy supply, while moving water specifically accounts for 59.3% of its electricity. Canada's proximity to the United States and a favorable exchange rate have also contributed to a strong manufacturing climate in the country. Canadians enjoy universal healthcare coverage, with all residents having access to free medical care through a government-provided program. As of 2019, the country's average life expectancy was a solid 82 years, while its infant mortality rate was 10 deaths per 1,000 live births.

China

- GDP (2019): $14,279.94 billion
- Population (2019): 1,397.71 million
- GDP per Capita (2019): $10,216.6

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- HDI (2020): 0.761

China is a developing country. Despite having the world's second-largest economy and the single largest military, China is still not classified as a developed country by the criteria of most organizations. In addition to having one of the lowest GDPs per capita on this list, another attribute indicating China is still developing is its dependence on agriculture, although this has been trending downward over time. In 2020, 7.7% of China's overall GDP was derived from agriculture. As of 2019, China's average life expectancy was 77 years, and its infant mortality rate was 11 per 1,000 live births. Although these rates aren't exceptionally high, they are noticeably worse than most other countries with trillions of dollars in overall wealth.

France

- GDP (2019): $2,715.52 billion
- Population (2019): 67.05 million
- GDP per Capita (2019): $40,496.4
- HDI (2020): 0.901

France is a developed country. The French Republic is one of the world's economic powerhouses. As of 2019, France has the seventh-largest economy by GDP. The country benefits from a diverse economy, including tourism, manufacturing, and pharmaceuticals. The French government has partially or fully privatized many prominent companies, though it maintains a strong presence in its power, public transport, and defense sectors. As of 2019, French citizens enjoyed a higher than average life expectancy of 83 years since birth and a low infant mortality rate of four deaths per 1,000 live births. The French healthcare system combines universal access to care with a substantial amount of freedom for patients, with surveys showing that citizens are overall satisfied with their country's system. Additionally, in 2020, unemployment in France sat at 8.34% and has been trending downward.

Germany

- GDP (2019): $3,861.12 billion
- Population (2019): 83.09 million
- GDP per Capita (2019): $46,467.5
- HDI (2020): 0.947

Germany is a developed country. Driven by its highly skilled labor force, Germany is Europe's strongest economy, and it is the fourth-largest economy in the world. The nation is known for delivering world-class quality products, including machinery, motor vehicles, electronics, and pharmaceuticals. In 2019, Germany was second only to China as the world's largest surplus economy, with its exported products exceeding its imported products. As of 2019, Germany had a life expectancy of 81 years since birth as well as an infant mortality rate of only three deaths per 1,000 live births. German citizens enjoy access to universal healthcare coverage. All Germans must belong to a not-for-profit sickness fund that covers most necessary medical procedures and medications. Just 0.3% of Germany's population reported an unmet need for medical care in 2017.

India

- GDP (2019): $2,868.93 billion
- Population (2019): 1,366.42 million
- GDP per Capita (2019): $2,099.
- HDI (2020): 0.645

India is a developing country. Although India is an exceptionally wealthy country (ranked fifth in terms of overall GDP), like China, its high population results in a rather low GDP per capita. The Republic of India is considered both a newly industrialized nation and one of the fastest developing countries on Earth. However, the country continues to struggle with issues like widespread poverty, poor water and sanitation, and overpopulation. India hosts a diverse economy, ranging from traditional farming to contemporary agriculture, and handicrafts to a wide range of industrial products. Thanks to a large and well-educated English-speaking population, India is a major exporter of IT services, business outsourcing services, and software workers. As of 2019, India had a life expectancy of 70 years since birth as well as an infant mortality rate of 28 deaths per 1,000 live births.

Indonesia

- GDP (2019): $1,119.19 billion
- Population (2019): 270.62 million
- GDP per Capita (2019): $4,135.6
- HDI (2020): 0.718

Indonesia is a developing country. The Republic of Indonesia is the world's most populous Muslim-majority country and Southeast Asia's largest economy. The nation's key exports include rubber, animal and vegetable fat, mineral fuels, machinery, electrical machinery, and mechanical appliance parts. A unique aspect of Indonesia's quality of life is that the country lies within the Pacific Ring of Fire, which is responsible for 90% of earthquakes and has 75% of the world's active volcanos. In addition to natural disaster hazards, the nation also faces challenges more common to developing countries, with 24 million Indonesians lacking safe water, 38 million lacking access to improved sanitation facilities, and 19.4 million being unable to meet their dietary requirements. As of 2019, Indonesia had a life expectancy of 72 years since birth, as well as an infant mortality rate of 20 deaths per 1,000 live births.

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Italy

- GDP (2019): $2,003.58 billion
- Population (2019): 60.30 million
- GDP per Capita (2019): $33,225.6
- HDI (2020): 0.892

Italy is a developed country. Italy's manufacturing industry is very well developed, and it is ranked seventh on Earth according to the World Economic Forum. In particular, Italy is known for producing high-quality luxury products, such as fashion accessories, expensive cars, and food products. Nearly 71% of Italy's more than 25 million workers are employed in the services sector, while just over 3.5% work in agriculture, which is a strong indicator that this nation is developed. Italy alone accounts for approximately 2.28% of the planet's entire wealth, ranked eighth in the world for overall GDP. The present-day commercial banking industry had its beginning in Italy, and today the nation's largest financial services company, Intesa Sanpaolo, is regularly ranked on the Fortune 500 list. As of 2019, the country's average life expectancy was 83 years from birth, while its infant mortality rate was 7 deaths per 1,000 live births.

Japan

- GDP (2019): $5,081.77 billion
- Population (2019): 126.26 million
- GDP per Capita (2019): $40,246.9
- HDI (2020): 0.919

Japan is a developed country. Despite its smaller size compared to other economically healthy countries, such as Germany or France, Japan is the third wealthiest nation on Earth in terms of overall GDP. More than 72% of the nation's workforce was in the services sector in 2019, while just over 3% was in agriculture. The archipelago is heavily dependent on imports of natural resources, and it is the world's largest net buyer of food products, the largest importer of liquefied natural gas (LNG), and the third-largest coal importer. As of 2019, Japan has an average life expectancy of 84 years from birth and an exceptionally low infant mortality rate of just two deaths per 1,000 live births.

Mexico

- GDP (2019): $1,268.87 billion
- Population (2019): 127.57 million
- GDP per Capita (2019): $9,946
- HDI (2020): 0.779

Mexico is a developing country. Mexico's development status is despite the fact that it exceeds the majority of its peers in the developing world on most economic and quality-of-life metrics. In fact, as of 2019, Mexico's economy wasn't heavily reliant on agriculture, at just 3.47%, while its services and industry sectors were much larger. Various other factors come close to, but don't quite hit, acceptable levels for developed-nation status. A life expectancy of 75 years since birth, as of 2019, ranks Mexico higher than most developing countries, but it still falls below its North American neighbors. The story is the same for the infant mortality rate, which was 12 per 1,000 live births that same year. In addition, Mexico is plagued by large swaths of poverty, lack of quality healthcare, and limited access to clean water.

The Netherlands

- GDP (2019): $907.05 billion
- Population (2019): 17.34 million
- GDP per Capita (2019): $52,295
- HDI (2020): 0.944

The Netherlands is a developed country. This nation demonstrates relative strength across all the metrics and combines a robust economy with a high standard of living for the majority of its residents. In 2017, the Dutch were the fifth lowest population at risk of poverty or social exclusion in the European Union. As of 2019, the Netherlands had a life expectancy of 82 years since birth as well as an infant mortality rate of four deaths per 1,000 live births. According to the OECD, the Netherlands fares well in providing its citizens with the tools necessary to build a high quality of life. Although the country is below average in environmental quality, the health and life expectancy for residents are in line with other developed countries. The Netherlands also ranks very highly in terms of work/life balance, with fewer than 0.4% of residents reporting that they work long hours in comparison with the global average of 11%.

Nigeria

- GDP (2019): $448.12 billion
- Population (2019): 200.96 million
- GDP per Capita (2019): $2,229.9
- HDI (2020): 0.539

Nigeria is a developing country. The Federal Republic of Nigeria's GDP is far too low, as are the country's living standards, for it to be considered a developed nation. Despite having the largest economy in Africa, industrialization in Nigeria lags behind most other major economies. The country also suffers from a low literacy rate -at roughly 62% as of 2018- and an overburdened healthcare system. Poverty is widespread, at a rate of 40.1% in 2019, and large swaths of the country lack access to clean water. In 2019, the infant mortality rate in Nigeria was a high 74 per 1,000 live births, while the life expectancy rate was a low 55 years

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since birth.

Poland

- GDP (2019): $595.86 billion
- Population (2019): 37.96 million
- GDP per Capita (2019): $15,694.7
- HDI (2020): 0.88

Poland is a developed country. The Republic of Poland, as of 2019, is the sixth largest country in the EU by GDP. A Soviet satellite state until 1989, the country has nearly completed its transformation into a democratic and market-oriented economy. Thanks to its strong economy, Poland is expected to quickly rebound once the COVID-19 pandemic comes to an end. Like many developed nations, Poland offers both free healthcare and higher education for its citizens. As of 2019, the country's infant mortality rate was just four per 1,000 live births, while the life expectancy rate was 78 years since birth. The country also has 16 properties recognized on the UNESCO World Heritage List, only one of which isn't a cultural site.

Russia

- GDP (2019): $1,699.88 billion
- Population (2019): 144.41 million
- GDP per Capita (2019): $11,585
- HDI (2020): 0.824

Russia is a country in transition. Russia is not currently classified as a developed country, though it once reigned alongside the United States as a world superpower. The country's economy fell apart with the 1991 implosion of the Soviet Union. Recently, low oil prices, the cost of Russia's illegal annexation of Crimea, and efforts to bolster its military have strained the country's finances. Poverty is widespread (at 13% of population, the majority of whom are children) and living standards are low (with Russian citizens on average giving it a 5.8 out of 10). As is typical of a non-developed country, the exportation of natural resources fuels much of Russia's economy. Russia is borderline at best on most developed-country metrics. Its infant mortality rate is five per 1,000, while life expectancy is 73 years since birth, below the global average of 75.

Saudi Arabia

- GDP (2019): $792.97 billion
- Population (2019): 34.27 million
- GDP per Capita (2019): $23,139.8
- HDI (2020): 0.854

Saudi Arabia is a developing country. On a purely monetary level, the Kingdom of Saudi Arabia is rather successful when compared to other developing countries. It was the largest economy in the Middle East in terms of GDP in 2019; however, its economy lacks diversification. Over 85% of government revenue is derived from oil exports, making Saudi Arabia the world's largest exporter of petroleum. Additionally, according to a 2020 Amnesty International report, the government has been heavily criticized for numerous human rights abuses, with nearly all known Saudi Arabian human rights defenders within the country having been detained or imprisoned. As of 2021, three women's rights activists have been conditionally released and remain subject to restrictions on traveling and speaking freely. As of 2019, Saudi Arabians had an average life expectancy of 75 years since birth as well as an infant mortality rate of six deaths per 1,000 live births.

South Korea

- GDP (2019): $1,646.74 billion
- Population (2019): 51.71 million
- GDP per Capita (2019): $31,846.2
- HDI (2020): 0.916

South Korea is a developing country. The country has a strong GDP and offers its citizens widespread access to quality healthcare and higher education. Following several decades of rapid economic growth and global integration, the Republic of Korea has become a high-technology and industrialized nation, with its most important sectors being electronics, telecommunications, automobile production, chemicals, shipbuilding, and steel. That said, the country is reliant on exports and is currently facing other major challenges, such as an aging population and low worker productivity. Life expectancy in 2019 was an impressive 83 years since birth. The infant mortality rate was rather low that same year, at just three per 1,000 live births.

Spain

- GDP (2019): $1,393.49 billion
- Population (2019): 47.13 million
- GDP per Capita (2019): $29,564.7
- HDI (2020): 0.904

Spain is a developed country. Nearly all organizations that analyze development status classify Spain as such. The country has a strong GDP, a literacy rate of nearly 100%, and a healthcare system that's one of the best in the world. Since returning to a democratic system in 1975, Spain has become the Eurozone's fourth-largest economy, with a diverse assortment of industries including manufacturing, financial services, pharmaceuticals, textiles and apparel, footwear, chemicals, and tourism. Spain's

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infant mortality and life expectancy numbers are excellent; an estimated three infants died per 1,000 live births in 2019, and the average Spaniard lived to be 83 years from birth during the same year.

Sweden

- GDP (2019): $530.88 billion
- Population (2019): 10.28 million
- GDP per Capita (2019): $51,648
- HDI (2020): 0.945

Sweden is a developed country. Sweden is one of the most highly developed post-industrial societies in the world. Sweden's life expectancy-now at nearly 83 years since birth-increased by eight years between 1980 and 2019, while infant mortality has dropped from seven deaths per 1,000 live births to two during the same period. Although Sweden has the highest income tax rate in the world, the country is also known for having a high quality of life and a low unemployment rate of roughly 9% in 2021. Additionally, Swedish citizens have free access to healthcare and higher education. The average Swede enjoys nearly 20 years of education. As a society, Sweden places great importance on environmental sustainability as well.

Switzerland

- GDP (2019): $703.08 billion
- Population (2019): 8.57 million
- GDP per Capita (2019): $81,989.4
- HDI (2020): 0.955

Switzerland is a developed country. According to the World Bank, of countries listed for 2019, Switzerland had the fourth highest GDP per capita and the highest of any country on this list. This can be attributed to the country's highly skilled labor force, which helps compensate for its smaller population. The country's largest economic sectors are financial services, precision manufacturing, metals, pharmaceuticals, chemicals, and electronics. Switzerland has a universal healthcare system while also preserving a private marketplace. As of 2019, the country's average life expectancy was an excellent 84 years, while its infant mortality rate was an unusually high 10 per 1,000 live births.

Thailand

- GDP (2019): $543.55 billion
- Population (2019): 69.62 million
- GDP per Capita (2019): $7,806.7
- HDI (2020): 0.777

Thailand is a developing country. The Kingdom of Thailand is the second-largest economy in Southeast Asia. Thailand has a free-market economy, with a relatively well-developed infrastructure. About two-thirds of the country's GDP is derived from exports of electronics, agricultural commodities, automobiles and parts, processed foods, and other goods. Over the last four decades, the country has moved from a low-income to an upper-income country by making substantial progress in social and economic development. Since becoming a constitutional monarchy in 1932, it has experienced 19 military coups. More recently, pro-democracy protests have been ongoing since Feb. 2020.

Turkey

- GDP (2019): $761.42 billion
- Population (2019): 83.43 million
- GDP per Capita (2019): $9,126.6
- HDI (2020): 0.82

Turkey is a developing country. Turkey is perhaps the best example of a country that straddles the line between developed and developing. In the past, the UN has classified it as a developed country. Today, most groups, including Turkey itself, agree on the country's status as a developing nation. Confounding the issue is Turkey's GDP, infant mortality rate, and life expectancy, all of which hover in the gray area. Its infant mortality rate at 28 per 1,000 live births, as of 2019, is lower than some other developing countries, but it's still notably high. Conversely, the country's life expectancy of 72 years from birth is higher than in some places, but below the global average of 75.

United Kingdom

- GDP (2019): $2,829.11 billion
- Population (2019): 66.84 million
- GDP per Capita (2019): $42,328.9
- HDI (2020): 0.932

The United Kingdom is a developed country. The United Kingdom of Great Britain and Northern Ireland was the sixth largest country by GDP in 2019, with Great Britain being the first industrialized country in history. GDP growth is heavily reliant on the services sector, particularly banking, insurance, and business services, whereas large oil and natural gas reserves are shrinking. In 2016, British citizens voted in favor of departing from the European Union-a decision that became known as Brexit. The U.K. formally left the EU on Jan. 31, 2020, although there wasn't a proper trade agreement between the two entities until a provisional one was approved by the European Parliament on April 28, 2021. As of 2019, the country's average life expectancy was a solid 81

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years, while its infant mortality rate was an unusually high 11 per 1,000 live births.

United States

- GDP (2019): $21,433.23 billion
- Population (2019): 328.24 million
- GDP per Capita (2019): $65,297.5
- HDI (2020): 0.926

The United States is a developed country. As of 2019, the United States was the wealthiest country on Earth in terms of total GDP, which is nearly 16% of the world's entire wealth. The U.S. is both the largest goods importer and the second-largest exporter, making it the world's largest trading nation. Additionally, as of 2021, America has the third-largest military in terms of personnel-second only to India. However, despite its wealth and high HDI score, the U.S. has also been heavily criticized for traits more commonly seen in developing nations, such as it being the only developed country without universal healthcare, having a poverty rate higher than any other industrialized nation, and its infrastructure being in severe need of repair and overhaul. As of 2019, the country's average life expectancy was 79 years from birth, while its infant mortality rate was 11 deaths per 1,000 live births.

Developing Countries

A developing country is a sovereign state with a less developed industrial base and a lower Human Development Index (HDI) relative to other countries. However, this definition is not universally agreed upon. There is also no clear agreement on which countries fit this category. The term low and middle-income country (LMIC) is often used interchangeably but refers only to the economy of the countries. The World Bank classifies the world's economies into four groups, based on gross national income per capita: high, upper-middle, lower-middle, and low income countries. Least developed countries, landlocked developing countries and Small Island developing states are all sub-groupings of developing countries. Countries on the other end of the spectrum are usually referred to as high-income countries or developed countries. There are controversies over this term's use, which some feel perpetuates an outdated concept of "us" and "them". In 2015, the World Bank declared that the "developing/developed world categorization" is becoming less relevant and that they will phase out the use of that descriptor. Instead, their reports will present data aggregations for regions and income groups. The term "Global South" is used by some as an alternative term to developing countries. Developing countries tend to have some characteristics in common often due to their histories or geographies. For example, with regards to health risks, they commonly have: low levels of access to safe drinking water, sanitation and hygiene; energy poverty; high levels of pollution (e.g. air pollution, indoor air pollution, water pollution); high proportion of people with tropical and infectious diseases (neglected tropical diseases); a high number of road traffic accidents; and generally poor infrastructure. Often, there is also widespread poverty, high crime rates, low education levels, inadequate access to family planning services, many informal settlements, and corruption at all government levels, and political instability. Global warming (climate change) is expected to impact developing countries more than wealthier countries, as most of them have a high "climate vulnerability".

Development aid or development cooperation is financial aid given by foreign governments and other agencies to support developing countries' economic, environmental, social, and political development. The Sustainable Development Goals by the United Nations were set up to overcome many of these problems. Many developed countries were only seen to have "developed" from the Industrial Age which preceded the age of colonialism, which robbed the wealth of countries such as India during the British colonization of India during Europe's rivalry for conquest of the world. France was also a rival in this quest for colonialism, colonizing other countries for nearly a stretch of around 400 years from Africa, Middle East, Asia to North America which it regarded as 'possessions' of the French empire. Other examples include Japan's colonization of East Asia in its quest for "Greater East Asian Co-Prosperity Sphere", which was later deemed to be an imperialist and fascist front by the Japanese for Japanese expansionism. It is commonly argued that developed countries or colonizer countries sought to bring civilization, but the opposite often happened instead, such as in instances of genocide, examples including the genocide of Australian Aborigines, the original inhabitants of Australia. Other countries' gain in industrialization and wealth also happened as a result from policies which robbed the wealth of others, such as the Jews being robbed of their wealth during the Holocaust, or other means of gaining wealth that resulted from war such as Switzerland shoring of Nazi gold. Additionally, some countries involvement in proxy wars such as South Korea's involvement in Vietnam secured it $558 million in 1966, $745 million in 1967, and $993 million in 1968 (this was close to 20 percent of total Korean earnings in 1967-68) in earnings for siding with American forces, propelling it from one of the poorest countries in the world to one of the richest countries on Earth due to what was regarded as undue gains. Developing countries on the other hand, were victims of these acts of brutality and were often the recipients of poverty, disease and decreased living conditions that occurred afterwards.

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Measure and Concept of Development

Development can be measured by economic or human factors. Developing countries are, in general, countries that have not achieved a significant degree of industrialization relative to their populations, and have, in most cases, a medium to low standard of living. There is an association between low income and high population growth. The development of a country is measured with statistical indices such as income per capita (per person), gross domestic product per capita, life expectancy, the rate of literacy, freedom index and others. The UN has developed the Human Development Index (HDI), a compound indicator of some of the above statistics, to gauge the level of human development for countries where data is available. The UN had set Millennium Development Goals from a blueprint developed by all of the world's countries and leading development institutions, in order to evaluate growt. These goals ended in 2015, to be superseded by the Sustainable Development Goals. The concept of the developing nation is found, under one term or another, in numerous theoretical systems having diverse orientations - for example, theories of decolonization, liberation theology, Marxism, anti-imperialism, modernization, social change and political economy. Another important indicator is the sectoral changes that have occurred since the stage of development of the country. On an average, countries with a 50% contribution from the secondary sector (manufacturing) have grown substantially. Similarly countries with a tertiary sector stronghold also see a greater rate of economic development.

Criticisms and Related Terms

There is criticism for using the term "developing country". The term could imply inferiority of this kind of country compared with a developed country. It could assume a desire to develop along the traditional Western model of economic development which a few countries, such as Cuba and Bhutan, choose not to follow. Alternative measurements such as gross national happiness have been suggested as important indicators. One of the early criticism that questioned the use of the terms "developing" and "underdeveloped" countries, was voiced in 1973 by prominent historian and academic Walter Rodney who compared the economic, social and political parameters between the United States and countries in Africa and Asia. There is "no established convention" for defining "developing country". According to economist and sustainable development expert Jeffrey Sachs, the current divide between the developed and developing world is largely a phenomenon of the 20th century. The late global health expert Hans Rosling has argued against the terms, calling the concept "outdated" since the terms are used under the prerequisite that the world is divided in rich and poor countries, while the fact is that the vast majority of countries are middle-income. Given the lack of a clear definition, sustainability expert Mathis Wackernagel and founder of Global Footprint Network, emphasizes that the binary labeling of countries is "neither descriptive nor explanatory". Wackernagel and Rosling both argue that in reality, there are not two types of countries, but over 200 countries, all faced with the same laws of nature, yet each with unique features. The term "developing" refers to a current situation and not a changing dynamic or expected direction of development. Since the late 1990s, countries identified by the UN as developing countries tended to demonstrate higher growth rates than those in the developed countries category.

To moderate the euphemistic aspect of the word "developing", international organizations have started to use the term less economically developed country for the poorest nations - which can, in no sense, be regarded as developing. This highlights that the standard of living across the entire developing world varies greatly. In 2015, the World Bank declared that the "developing / developed world categorization" is becoming less relevant, due to worldwide improvements in indices such as child mortality rates, fertility rates and extreme poverty rates. In the 2016 edition of its World Development Indicators (WDI), the World Bank made a decision to no longer distinguish between "developed" and "developing" countries in the presentation of its data, considering the two-category distinction outdated. Accordingly, World Bank is phasing out use of that descriptor. Instead, the reports by World Bank (such as the WDI and the Global Monitoring Report) now include data aggregations for the whole world, for regions, and for income groups - but not for the "developing world".

Third World

Over the past few decades since the fall of the Soviet Union and the end of the Cold War, the term Third World has been used interchangeably with developing countries, but the concept has become outdated in recent years as it no longer represents the current political or economic state of the world. The three-world model arose during the Cold War to define countries aligned with NATO (the First World), the Communist Bloc (the Second World, although this term was less used), or neither (the Third World). Strictly speaking, "Third World" was a political, rather than an economic, grouping.

Global South

The term "Global South" began to be used more widely since about 2004. It can also include poorer "southern" regions of wealthy "northern" countries. The Global South refers to these countries' "interconnected histories of colonialism, neo-imperialism, and differential economic and social change through which large inequalities in living standards, life expectancy, and access to resources are maintained".

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Associated Theories

The term "developing countries" has many research theories associated with it (in chronological order): Modernization theory -to explain the process of modernization within societies Dependency theory- the notion that resources flow from a "periphery" of poor and underdeveloped states to a "core" of wealthy states, enriching the latter at the expense of the former Development theory - a collection of theories about how desirable change in society is best achieved. Post-Development theory holds that the whole concept and practice of development is a reflection of Western-Northern hegemony over the rest of the world.

Common Characteristics

Government, Politics and Administration

Many developing countries have only attained full self-determination and democracy after the second half of the 20th century. Many were governed by an imperial European power until decolonization. Political systems in developing countries are diverse, but most states had established some form of democratic governments by the early 21st century, with varying degrees of success and political liberty. The inhabitants of developing countries were introduced to democratic systems later and more abruptly than their Northern counterparts and were sometimes targeted by governmental and non-governmental efforts to encourage participation. 'Effective citizenship' is defined by sociologist Patrick Heller as: "closing [the] gap between formal legal rights in the civil and political arena, and the actual capability to meaningfully practice those rights". Beyond citizenship, the study of the politics of cross-border mobility in developing countries has also shed valuable light in migration debates, seen as a corrective to the traditional focus on developed countries. Some political scientists identify a 'typology of nationalizing, developmental, and neoliberal migration management regimes' across developing countries.

Advantages and Disadvantages of Renewable Energy

Why is Renewable Energy Important?

We're now facing unprecedented heatwaves, polluted air, and unbelievable health issues caused by fossil fuels. In Addition to this issue, fossil fuels are about to run out if we continue to burn them uncontrollably.

Renewable energy sources are our best chance to stop the current trend and make the world a better place to live. Therefore, governments are thinking of using renewable sources of energy to generate electric power. As a result, there is increasing usage of renewable energy for generating electricity in all countries. For example, the share of renewable energy in global electricity generation was increased to 29% in 2020. This is a success compared with a 27% share in electricity generation in 2019. Some advanced countries such as the UK have aimed for 100% renewable cities by 2050. Currently, around 43% of the UK's electricity is generated by renewables. In spite of many obstacles in the way towards 100% renewable energy, there are promising advantages to using renewable technologies. Overall, the advantages of using renewable energy sources outweigh the disadvantages. Although the initial cost of establishing a network of renewable technologies might be higher, over time, the expenses will be offset. Considering the lateral influencers of using renewable energy, postponing the process of shifting toward 100% renewable is not a wise course of action.

Wind, geothermal, solar, hydro, tidal, hydrogen, and other renewable technologies are a widely popular source of energy throughout the world today. Countries, corporations, and individuals are adopting renewables for a number of great benefits. In this article, we'll dive into some of the advantages and disadvantages of renewable energy Table 2.

Table 2: Advantages and disadvantages of renewable energy.

Advantages	disadvantages
Renewable energy won't run out	Renewable energy has high upfront costs
Renewable energy has lower maintenance requirements	Renewable energy is intermittent
Renewables save money	Renewables have limited storage capabilities
Renewable energy has numerous environmental benefits	Renewable energy sources have geographic limitations
Renewables lower reliance on foreign energy sources	Renewables aren't always 100% carbon-free
Renewable energy leads to cleaner water and air	
Renewable energy creates jobs	
Renewable energy can cut down on waste	

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Advantages of renewable energy

Renewable energy has multiple advantages over fossil fuels. Here are some of the top benefits of going green:

- Renewable energy won't run out
- Renewable energy has lower maintenance requirements
- Renewables save money
- Renewable energy has numerous environmental benefits
- Renewables lower reliance on foreign energy sources
- Renewable energy leads to cleaner water and air
- Renewable energy creates jobs
- Renewable energy can cut down on waste

Renewable energy won't run out

Renewable energy technologies use resources straight from the environment to generate power. These energy sources include sunshine, wind, tides, and biomass, to name some of the more popular options. Renewable resources won't run out, which cannot be said for many types of fossil fuels - as we use fossil fuel resources, they will be increasingly difficult to obtain, likely driving up both the cost and environmental impact of extraction.

Maintenance requirements are lower for renewable energy

In most cases, renewable energy technologies require less overall maintenance than generators that use traditional fuel sources. This is because generating technology like solar panels and wind turbines either have few or no moving parts or don't rely on flammable, combustible fuel sources to operate. Fewer maintenance requirements translate to more time and money saved.

Renewables save money

Using renewable energy can help you save money long term. Not only will you save on maintenance costs, but on operating costs as well. When you're using a technology that generates power from the sun, wind, steam, or natural processes, you don't have to pay to refuel. The amount of money you will save using renewable energy can vary depending on a number of factors, including the technology itself. In most cases, transitioning to renewable energy means anywhere from hundreds to thousands of dollars in savings find out how much you can save by switching to solar energy.

Renewable energy has numerous environmental benefits

Renewable energy generation sources emit little to no greenhouse gases or pollutants into the air. This means a smaller carbon footprint and an overall positive impact on the natural environment. During the combustion process, fossil fuels emit high amounts of greenhouse gases, which have been proven to exacerbate the rise of global temperatures and frequency of extreme weather events. The use of fossil fuels not only emits greenhouse gases but other harmful pollutants as well that lead to respiratory and cardiac health issues. With renewable energy, you're helping decrease the prevalence of these pollutants and contributing to an overall healthier atmosphere.

Renewables lower reliance on foreign energy sources

With renewable energy technologies, you can produce energy locally. The more renewable energy you're using for your power needs, the less you'll rely on imported energy, and the more you'll contribute to U.S. energy independence as a whole. Renewable energy sources can help us minimize the geo-political risks associated with fossil fuels, from trade disputes to political instability to pricing wars, all of which are often rooted in access to oil.

Renewable energy leads to cleaner water and air

When you burn fossil fuels to generate electricity, it contaminates the air and water we use. For example, coal power stations release high volumes of carbon dioxide and nitrous oxide, as well as harmful toxins like mercury, lead, and sulfur dioxide. Health problems from ingesting these elements can be dangerous, and even fatal in some cases. Investing in renewable energy is a great way to work against these risks, as renewables have a far lower negative impact on our air and water. The use of fossil fuels not only emits greenhouse gases but other harmful pollutants as well that lead to respiratory and cardiac health issues. With renewable energy, you're helping decrease the prevalence of these pollutants and contributing to an overall healthier environment.

Renewable energy creates new jobs

While the U.S. shifts its focus to combat global warming, we're setting ambitious carbon-reduction goals that require labor to get the job done. Today, the renewable energy sector employs three times as many people as fossil fuels do in the U.S. That number is expected to rise over the next few years-and as a plus, these jobs tend to pay above average wages, making it a very attractive career option and an overall economic boom.

Renewable energy can help solve our waste problem

Specifically, biomass energy can offer a big benefit in this way. Biomass generators consume used organic products like vegetable oil, corn and soybean byproducts, and even algae to generate energy. Because of this, using biomass as an energy source can reduce the amount of waste that goes into landfills, which helps cut down on carbon emissions and environmental contamination.

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Disadvantages of renewable energy

Renewable energy has many benefits, but it's not always sunny when it comes to renewable energy. Here are some disadvantages to using renewables over traditional fuel sources:

- Renewable energy has high upfront costs
- Renewable energy is intermittent
- Renewables have storage capabilities
- Renewable energy sources have geographic limitations
- Renewables aren't always 100% carbon-free

Higher upfront cost

While you can save money by using renewable energy, the technologies are typically more expensive upfront than traditional energy generators. To combat this, there are often financial incentives, such as tax credits and rebates, available to help alleviate your initial costs of renewable technology.

Intermittency

Though renewable energy resources are available around the world, many of these resources aren't available 24/7, year-round. Some days may be windier than others, the sun doesn't shine at night, and droughts may occur for periods of time. There can be unpredictable weather events that disrupt these technologies. Fossil fuels are not intermittent and can be turned on or off at any given time. Wondering if you should make the switch to renewables? Find out if an energy source like solar power is a good fit for you.

Storage Capabilities

Because of the intermittency of some renewable energy sources, there's a high need for energy storage. While there are storage technologies available today, they can be expensive, especially for large-scale renewable energy plants. It's worth noting that energy storage capacity is growing as the technology progresses, and batteries are becoming more affordable as time goes on.

Geographic limitations

The United States has a diverse geography with varying climates, topographies, vegetation, and more. This creates a beautiful melting pot of landscapes but also means that there are some geographies that are more suitable for renewable technologies than others. For example, a large farm with open space may be a great place for a residential wind turbine or a solar energy system, while a townhome in a city covered in shade from taller buildings wouldn't be able to reap the benefits of either technology on their property. If your property isn't suitable for a personal renewable energy technology, there are other options. If you're interested in solar but don't have a sunny property, you can often still benefit from renewable energy by purchasing green power or enrolling in a community solar option.

Not 100% carbon-free

Although solar panels and other forms of renewable energy drastically reduce carbon emissions, these resources aren't always completely clean. The manufacturing, transportation, and installation of renewable energy, like wind turbines, can create a carbon footprint since they're usually produced in factories that are powered by fossil fuels -not to mention the diesel and gasoline needed to fuel the transport trucks. As the U.S. becomes more and more electrified - from solar panels on factories, to electric transport trucks - carbon emissions associated with solar will continue to decrease.

Supply Chain Constraints

Renewables must have an effective distribution network created to transfer the energy where it's needed on a large scale. These networks need non-renewable energies to be generated, which offsets the benefits of renewable energy for a bit until it's paid back. Additionally, politics can play a factor in installing renewable energy if it's not a priority among local governments.

Renewable Energy Has More Benefits than Drawbacks

When it comes to renewable energy, the positives outweigh the negatives. Transitioning to renewables on a personal, corporate, or governmental level will not only help you save money but also promote a cleaner, healthier environment for the future. Installing solar panels is one of the easiest ways to go green. By signing up on the Energy Sage Solar Marketplace, you can compare multiple quotes from local, pre-screened installers to see what solar costs and savings for your property. The quotes will also include estimates of the amount of carbon dioxide emissions you will offset over 20 years, and what this equates to in both trees planted and gallons of gasoline burned.

Renewability and Sustainability

Geothermal power is considered to be renewable because any projected heat extraction is small compared to the Earth's heat content. The Earth has an internal heat content of 1031 joules (3·1015 TWh), approximately 100 billion times the 2010 worldwide annual energy consumption. About 20% of this is residual heat from planetary accretion; the remainder is attributed to past and current radioactive decay of naturally occurring isotopes. For example, a 5275 m deep borehole in United Downs Deep Geothermal Power Project in Cornwall, England, found granite with very high thorium content, whose radioactive decay is believed to power the high temperature of the rock. Natural heat flows are not in equilibrium, and the planet is slowly cooling down on geologic timescales. Human extraction taps a minute fraction of the natural outflow, often without accelerating it. According to most official descriptions of geothermal energy use, it is currently called renewable and sustainable because it returns an equal volume of water to the area that the heat extraction takes place, but at a somewhat lower temperature. For instance, the

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water leaving the ground is 300 degrees, and the water returning is 200 degrees, the energy obtained is the difference in heat that is extracted. Current research estimates of impact on the heat loss from the Earth's core are based on a studies done up through 2012. However, if household and industrial uses of this energy source were to expand dramatically over coming years, based on a diminishing fossil fuel supply and a growing world population that is rapidly industrializing requiring additional energy sources, then the estimates on the impact on the Earth's cooling rate would need to be re-evaluated.

Geothermal power is also considered to be sustainable thanks to its power to sustain the Earth's intricate ecosystems. By using geothermal sources of energy present generations of humans will not endanger the capability of future generations to use their own resources to the same amount that those energy sources are presently used. Further, due to its low emissions geothermal energy is considered to have excellent potential for mitigation of global warming. Even though geothermal power is globally sustainable, extraction must still be monitored to avoid local depletion. Over the course of decades, individual wells draw down local temperatures and water levels until a new equilibrium is reached with natural flows. The three oldest sites, at Larderello, Wairakei, and the Geysers have experienced reduced output because of local depletion. Heat and water, in uncertain proportions, were extracted faster than they were replenished. If production is reduced and water is reinjected, these wells could theoretically recover their full potential. Such mitigation strategies have already been implemented at some sites. The long-term sustainability of geothermal energy has been demonstrated at the Lardarello field in Italy since 1913, at the Wairakei field in New Zealand since 1958, and at The Geysers field in California since 1960.

Falling electricity production may be boosted through drilling additional supply boreholes, as at Poihipi and Ohaaki. The Wairakei power station has been running much longer, with its first unit commissioned in November 1958, and it attained its peak generation of 173 MW in 1965, but already the supply of high-pressure steam was faltering, in 1982 being derated to intermediate pressure and the station managing 157 MW. Around the start of the 21st century it was managing about 150 MW, then in 2005 two 8 MW isopentane systems were added, boosting the station's output by about 14 MW. Detailed data are unavailable, being lost due to re-organisations. One such re-organisation in 1996 causes the absence of early data for Poihipi (started 1996), and the gap in 1996/7 for Wairakei and Ohaaki; half-hourly data for Ohaaki's first few months of operation are also missing, as well as for most of Wairakei's history Figure 1. What is my future vision? In my opinion, what factors should a manager consider in management? How can a manager manage? What characteristics should a manager have? In my opinion, a manager should plan his organization well, and to form a good team in human resources, we need certain characteristics to proceed according to a protocol. Enters the organization with psychological tests, and places each person in their appropriate position so that both that person feels satisfied and grows and the organization benefits from that person's presence. In fact, I think an organization depends on several factors to maintain And its survival requires that one is human resources and the other is constant updating of the company's goals and training to other personnel in different positions.

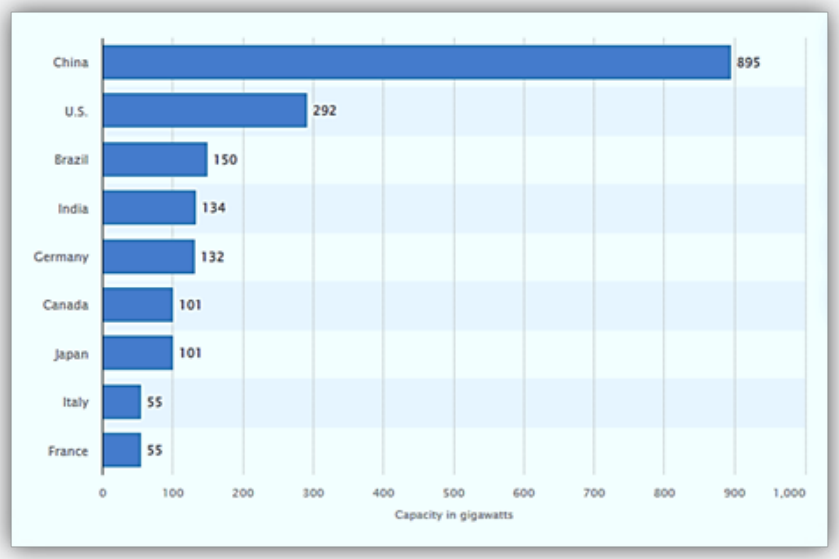

Figure 1: I will end this book and this chapter of the book with just this image, so that years later (around 2035), based on real and accurate statistics, you will see that these same countries will be the pioneers of world economy and politics!

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If I want to talk about the characteristics of a good manager here, it is that a manager must have factors such as patience and determination, eloquence, ability to plan, having a vision for more sales, human organization, creativity, understanding of personnel, need identification. Customers in line with the type of business, strong relationships with all customers, especially regular customers, the art of paying special attention to special guests, flexibility towards personnel and customers as long as there is no damage to the organization. In the end, a modern manager in any field should consider other characteristics related to the universe in addition to the goals of the organization, regulations, laws, and human resources, so that the next generations will have a healthy method without harming the universe. Or manage several organizations in order to advance new management methods in all areas to a new way of thinking that minimizes various damages, both psychological and ecosystem. Grow so as not to harm the organization. It is a mission to return this position, which should be a good example for other people in all areas.

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