Annals of Technology Education Practitioners Association of Nigeria
ATEPAN (September, 2026) 11(1), 33-44
ISSN: 2645-2839 (Print)
eISSN: 2645-2847 (Online)

BUSINESS VENTURES IN APPLIED AND NATURAL SCIENCES USING COMPUTER AND IT'S APPLICATIONS: A REVIEW

Madubuezi C. Okoronkwo[1] Samuel G. Dickson[2] Ojinnaka C. Raphael[3]
Correspondence email address: *ojinnaka.ebuka@mouau.edu.ng*
Computer Science Department, Michael Okpara University of Agriculture, Umudike.

Abstract: *The advancement of computer technology has significantly influenced the development of business ventures in applied and natural sciences. Fields such as chemistry, physics, mathematics, statistics, geology, computer science, microbiology, biochemistry, plant sciences, biotechnology, zoology, and environmental biology increasingly rely on computers for research, analysis, and innovation. This paper critically reviews the mechanisms through which advanced computational tools ranging from high-performance simulations and artificial intelligence frameworks to bioinformatics pipelines and geospatial modeling systems drive commercialization across diverse domains, including biotechnology, environmental management, precision agriculture, and advanced materials science. Furthermore, the paper investigates the profound structural, economic, ethical, and operational implications accompanying these technology-driven business models. The study highlights various opportunities for science-based enterprises and emphasizes the role of digital tools in improving efficiency, accuracy, and scalability of scientific activities. The paper concludes that integrating computer technology with scientific knowledge creates numerous opportunities for sustainable business ventures.*
Keywords: *Computer Applications, Scientific Entrepreneurship, Biotechnology, Data Analytics, Environmental Monitoring and Scientific Innovation.*

Introduction

Applied and natural sciences have long served as fundamental pillars for technological advancement, innovation, and economic development in modern societies. These scientific disciplines provide the knowledge and tools needed to understand natural phenomena, develop new technologies, and solve complex problems that affect human life and the environment. Fields such as chemistry, physics, mathematics, statistics, geology, microbiology, biochemistry, plant sciences, biotechnology, zoology, and environmental biology contribute significantly to improving healthcare systems, enhancing agricultural productivity, protecting the environment, and supporting industrial production.

Chemistry, for instance, plays a crucial role in the development of pharmaceuticals, industrial chemicals, fertilizers, and new materials that improve everyday life. Physics contributes to technological innovations in areas such as energy generation, electronics, telecommunications, and transportation systems. Mathematics and statistics provide essential analytical tools used in scientific modeling, financial forecasting, engineering design, and data analysis. Similarly, geology assists in the exploration and management of natural resources such as minerals, petroleum, and groundwater, which are essential for industrial growth and national development.

Biological sciences, including microbiology, biochemistry, plant sciences, biotechnology, zoology, and environmental biology, are equally important in addressing global challenges such as food security, disease control, biodiversity conservation, and environmental sustainability. For example, microbiology helps scientists understand microorganisms that cause diseases and those that can be used in food production, medicine, and environmental cleanup. Biotechnology and biochemistry contribute to the development of vaccines, genetically improved crops, and new medical treatments. Plant sciences support agricultural research aimed at increasing crop yields and improving resistance to pests and diseases, while zoology helps in wildlife conservation and ecosystem management. Environmental biology focuses on understanding ecological systems and developing strategies for protecting natural environments from pollution and degradation.

In recent decades, the rapid advancement of computer technology has dramatically transformed the way scientific research and applications are conducted. Computers have become essential tools for scientists and researchers across all scientific disciplines. Modern computing systems enable scientists to perform

highly complex calculations, process vast amounts of data, and create sophisticated simulations that help explain natural phenomena and predict future outcomes.

One of the most significant contributions of computers to scientific research is their ability to handle large datasets and perform advanced statistical analyses. Scientific research often involves the collection and interpretation of massive amounts of data, which would be extremely difficult to analyze manually. With the help of powerful computing systems and specialized software, researchers can analyze these datasets efficiently, identify patterns, and generate accurate conclusions that support scientific discovery and innovation.

In addition to data analysis, computers also play a major role in scientific modeling and simulation. Scientists use computer-based models to simulate chemical reactions, biological processes, environmental systems, and physical phenomena. These simulations allow researchers to test hypotheses, predict experimental outcomes, and explore complex systems without the need for expensive or time-consuming physical experiments. As a result, computer simulations significantly reduce research costs and accelerate the pace of scientific discovery.

The integration of computer technology into scientific research has also facilitated the development of advanced laboratory equipment and automated research systems. Many modern laboratories now rely on computer-controlled instruments for data collection, experimental monitoring, and result analysis. These digital laboratory systems improve the accuracy, reliability, and efficiency of scientific experiments while minimizing human errors.

Beyond supporting research activities, computer technology has also created new opportunities for transforming scientific discoveries into profitable business ventures. As scientific knowledge expands and computing technologies become more accessible, many researchers and entrepreneurs are increasingly turning scientific innovations into commercial products and services. This process of converting research findings into marketable solutions is often referred to as research commercialization or scientific entrepreneurship.

The integration of computer applications within scientific disciplines has led to the emergence of numerous technology-driven businesses and startups. For example, biotechnology companies use computer-based bioinformatics tools to analyze genetic information and develop new medical treatments. Environmental monitoring companies rely on computer systems, sensors, and data analytics platforms to track pollution levels and assess environmental conditions. Similarly, data analytics firms apply statistical computing and machine learning techniques to extract valuable insights from complex datasets for businesses, governments, and research institutions.

Digital laboratories and scientific software companies have also emerged as important players in the modern scientific economy. These businesses develop laboratory management systems, simulation software, research databases, and analytical tools that support scientific research and industrial applications. Such innovations enable scientists, engineers, and organizations to conduct research more efficiently and develop new technologies more rapidly.

Furthermore, computer applications have enabled the growth of precision agriculture, remote sensing technologies, and geographic information systems, which support businesses in agriculture, geology, environmental management, and resource exploration. These technologies help scientists and entrepreneurs collect and analyze environmental and spatial data, leading to improved decision-making and sustainable resource management.

The expansion of technology-based scientific enterprises has not only accelerated innovation but has also contributed significantly to job creation and economic growth. Science-based businesses create employment opportunities for scientists, engineers, computer programmers, technicians, and data analysts. In addition, these businesses stimulate industrial development, encourage technological advancement, and support knowledge-based economies.

Given the increasing importance of computers in scientific research and entrepreneurship, it is essential to examine how computer applications support business development across various scientific disciplines. Understanding the relationship between scientific knowledge, computer technology, and entrepreneurship can help policymakers, educators, and researchers promote innovation and encourage the development of sustainable science-based enterprises.

Therefore, this paper aims to review the role of computer technology in promoting business ventures within applied and natural sciences. It examines how computer applications enhance scientific research, facilitate innovation, and support the commercialization of scientific discoveries across disciplines such as chemistry, physics, mathematics, statistics, geology, microbiology, biotechnology, and environmental sciences. By exploring these relationships, the study highlights the growing importance of digital technologies in driving scientific entrepreneurship and economic development.

Literature Review

The growing integration of scientific knowledge with computer technology has significantly transformed research, innovation, and entrepreneurship in applied and natural sciences. Existing literature shows that computers play a critical role in enabling scientists to analyze complex data, simulate scientific processes, and develop technological solutions that can be commercialized. As computing power and digital tools continue to advance, many scientific discoveries are increasingly being translated into profitable business ventures and technology-driven enterprises. Scholars emphasize that the combination of scientific expertise and computational tools has accelerated innovation, improved research productivity, and created new opportunities for entrepreneurship across various scientific disciplines (Laudon & Laudon, 2018).

Researchers have identified several areas where computer applications have transformed scientific research into commercially viable enterprises. Computers allow scientists to perform complex calculations, manage large datasets, and conduct simulations that reduce the need for expensive experimental procedures. These capabilities have made it easier for researchers and entrepreneurs to convert scientific ideas into practical products and services in fields such as biotechnology, pharmaceuticals, environmental management, and engineering (Press et al., 2007).

One major area highlighted in the literature is the role of bioinformatics in biotechnology and microbiology. Bioinformatics refers to the use of computational tools, databases, and algorithms to analyze biological information such as DNA sequences, protein structures, and genetic variations. The rapid growth of genomic data has made it necessary for scientists to rely on computer-based systems to store, process, and interpret biological information. Bioinformatics tools help researchers understand genetic patterns, identify disease-causing genes, and develop targeted therapies for various medical conditions. As a result, biotechnology companies increasingly depend on computational biology techniques to accelerate drug discovery, vaccine development, and medical diagnostics. These advancements have led to the establishment of businesses specializing in genetic testing, pharmaceutical research, and personalized medicine (Lesk, 2019).

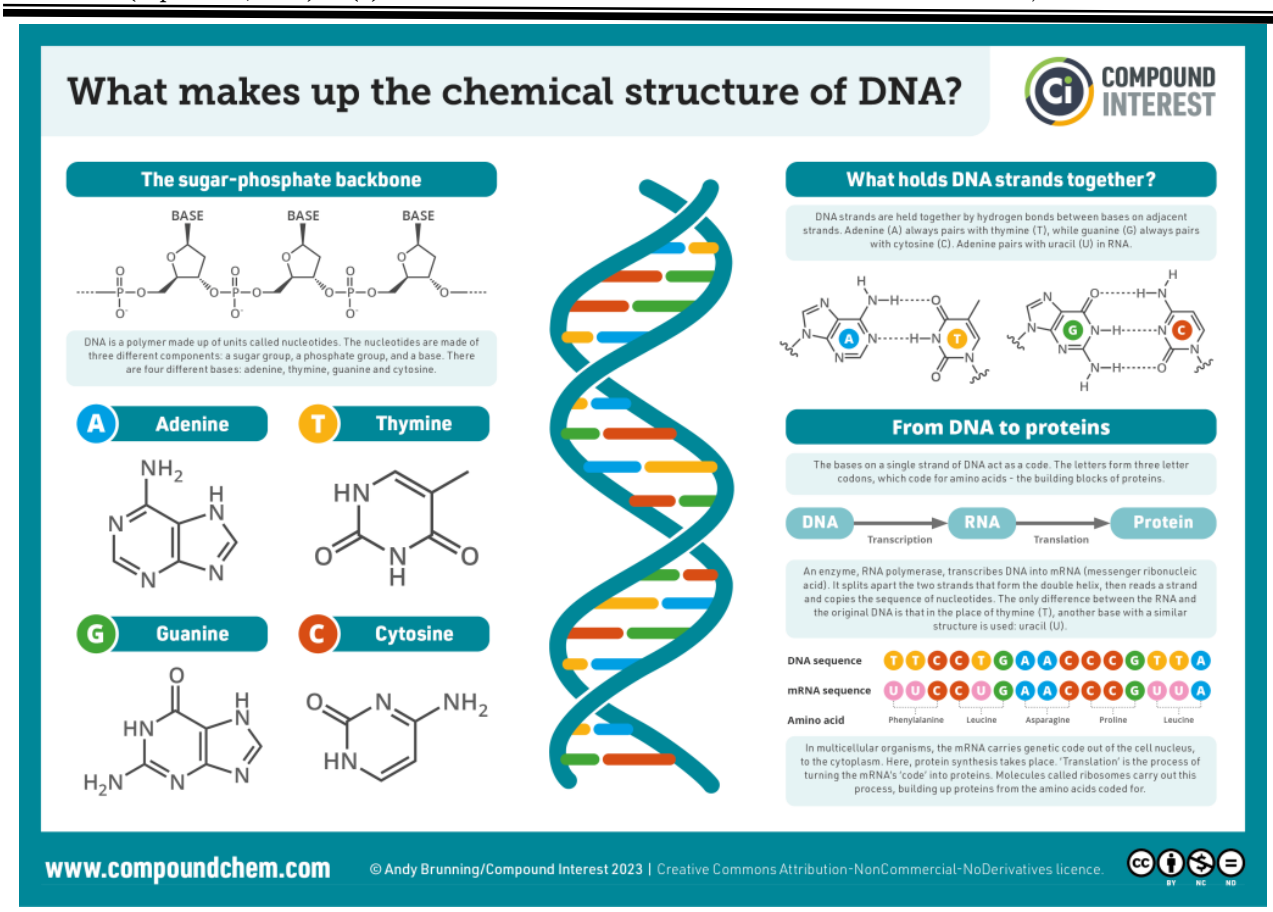


Figure 1: Showing make up of chemical structure of DNA (https://www.google.com)

Similarly, computer applications have greatly influenced research and innovation in chemistry and physics through computational modeling and simulation technologies. Computational chemistry involves the use of computer algorithms and mathematical models to study the structure and behavior of molecules and chemical reactions. Scientists use simulation software to predict how molecules interact, which helps them design new drugs, materials, and chemical products. This approach reduces the need for repeated laboratory experiments, thereby saving time and research costs while improving the efficiency of product development (Jensen, 2017).

In physics, computer simulations are widely used to study complex systems that cannot easily be analyzed using traditional experimental methods. For example, scientists use computational models to analyze fluid dynamics, energy production systems, material properties, and electronic devices. These simulations help researchers understand physical phenomena, test theoretical predictions, and design technological innovations in fields such as renewable energy, aerospace engineering, and telecommunications. Businesses that provide simulation software, engineering modeling services, and technological consulting have emerged as a result of these scientific and technological advancements.

Another important area discussed in the literature is the growing importance of statistical computing and data analytics in scientific research and business development. The rapid expansion of digital data in fields such as healthcare, finance, environmental science, and agriculture has created a strong demand for professionals who can analyze and interpret large datasets. Statistical software and programming tools allow scientists to develop predictive models, identify trends, and make data-driven decisions. As a result, many professionals trained in statistics and computer science have established businesses that provide data analytics services, artificial intelligence solutions, and machine learning applications. These businesses help organizations extract meaningful insights from complex data and improve decision-making processes (James et al., 2021).

The literature also highlights the role of computer technology in geology and environmental sciences, particularly through the use of Geographic Information Systems (GIS) and remote sensing technologies. GIS is a computer-based system used to collect, store, analyze, and visualize spatial or geographic data.

Scientists use GIS to study landforms, analyze geological structures, monitor environmental changes, and manage natural resources. In geology, GIS technology helps identify mineral deposits, map geological formations, and support exploration activities for oil, gas, and other natural resources. This has led to the development of businesses that specialize in mineral exploration, geological surveying, and natural resource management.

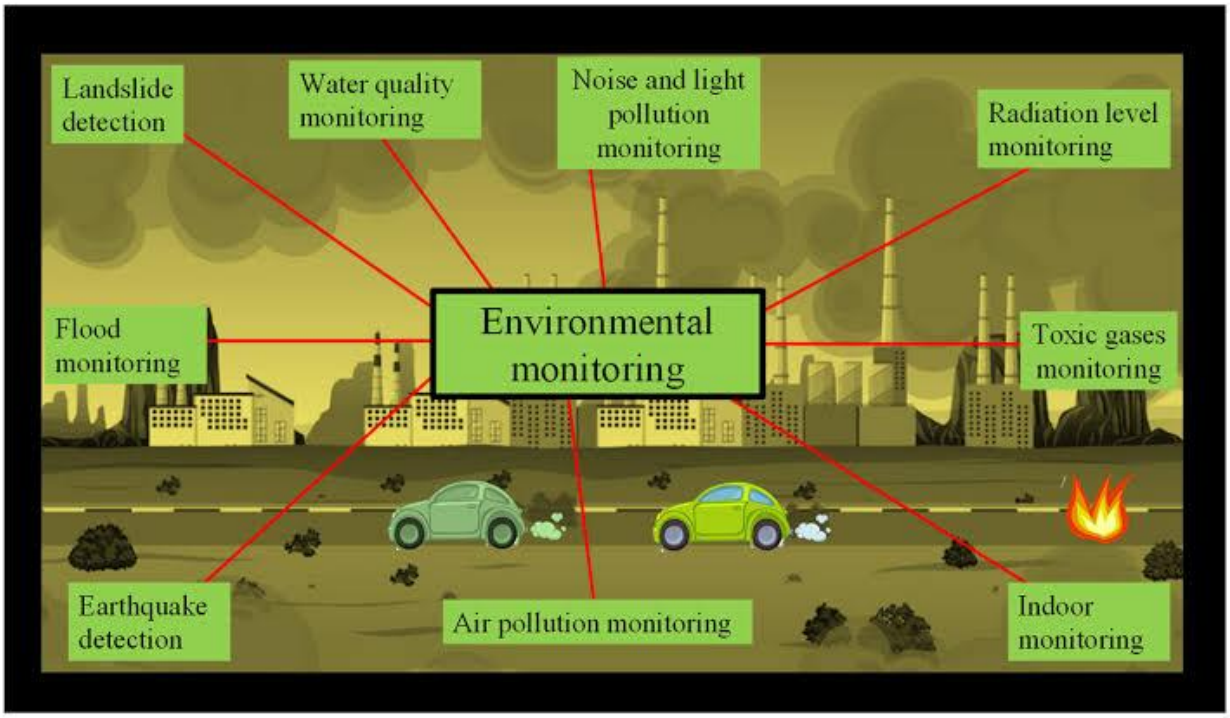


Figure 2: Comprehensive Environmental monitoring (https://www.google.com)

Remote sensing technologies further enhance the capabilities of GIS by using satellites, drones, and aerial imaging systems to collect environmental data from large geographic areas. Environmental scientists use these technologies to monitor deforestation, climate change, pollution levels, and natural disasters such as floods and landslides. As a result, many environmental consulting firms and disaster management organizations rely on GIS and remote sensing tools to assess environmental risks and develop sustainable management strategies (Burrough, McDonnell, & Lloyd, 2023).

In addition, the literature highlights the growing importance of laboratory automation and digital research infrastructure in modern scientific enterprises. Advances in computer technology have enabled the development of automated laboratory systems that can perform experiments, collect data, and analyze results with minimal human intervention. These systems are widely used in biotechnology, microbiology, pharmaceutical research, and chemical analysis laboratories. Laboratory automation improves efficiency, reduces human errors, and increases the reliability and reproducibility of scientific experiments.

Environmental monitoring systems also represent an important area where computer applications support scientific business ventures. Sensors, data logging devices, and digital monitoring platforms allow scientists to track environmental conditions such as air quality, water pollution, and climate patterns in real time. Businesses involved in environmental monitoring provide services to governments, industries, and environmental organizations that require accurate environmental data for regulatory compliance and sustainable development.

Furthermore, computer technology has contributed to the growth of agricultural biotechnology and precision agriculture. Scientists use computer-based tools to analyze soil data, monitor crop health, and optimize irrigation and fertilizer use. Biotechnology companies apply genetic engineering and molecular biology techniques to develop improved crop varieties with higher yields and resistance to pests and diseases. These innovations have created new business opportunities for agricultural technology companies, research laboratories, and environmental consulting firms.

Overall, the literature consistently demonstrates that computer technology plays a critical role in improving productivity, accuracy, and efficiency in science-based enterprises. By enabling advanced data analysis, modeling, automation, and digital communication, computers allow scientists to transform research findings into commercial products and services. The integration of computer applications across scientific disciplines continues to drive innovation, support entrepreneurship, and promote the development of technology-based businesses that contribute to economic growth and societal development.

Methodology

The study adopts a review-based research methodology to examine the role of computer technology in promoting business ventures within applied and natural sciences. A review-based approach involves collecting, analyzing, and synthesizing information from previously published scholarly works in order to understand existing knowledge, identify trends, and highlight research gaps. This method is appropriate for the study because it allows the researcher to evaluate a wide range of scientific literature and obtain a comprehensive understanding of how computer applications support innovation, entrepreneurship, and commercialization in various scientific disciplines.

The research design for this study is based on a descriptive literature review, which focuses on summarizing and interpreting existing studies related to applied sciences, natural sciences, computer technology, and scientific entrepreneurship. The purpose of this design is to gather information from different academic sources and integrate their findings to provide a clear understanding of how computer technologies contribute to the development of science-based enterprises.

The descriptive review approach enables the researcher to examine different scientific fields including chemistry, physics, mathematics, statistics, geology, microbiology, biotechnology, environmental biology, and computer science and identify the various ways in which computer applications are used to support business ventures in these disciplines.

The data used in this study were obtained from secondary sources, which consist of previously published academic and scholarly materials. These sources include: Peer-reviewed journal articles, Academic textbooks, Conference proceedings, Research reports and Scholarly online publications and digital libraries

These materials were selected because they provide reliable and well-documented information on scientific research, technological innovations, and the application of computer technology in various scientific fields.

To ensure the credibility and reliability of the information used in the study, the literature was obtained from recognized academic databases and educational platforms such as: Google Scholar, ScienceDirect, JSTOR, SpringerLink and University library databases. These databases contain high-quality scholarly publications that are widely used by researchers, educators, and professionals in scientific and technological fields.

The process of data collection involved systematically searching and gathering relevant academic materials from the selected databases. Keywords such as *computer applications in science*, *scientific entrepreneurship*, *bioinformatics*, *computational modeling*, *data analytics*, *GIS technology*, and *technology-based startups* were used to locate appropriate sources.

After identifying relevant publications, the researcher carefully reviewed the abstracts, introductions, and conclusions of the materials to determine their relevance to the study. Selected documents were then examined in detail to extract important information related to computer technology applications and business opportunities in scientific disciplines.

The collected materials were analyzed using qualitative content analysis, which involves identifying patterns, themes, and relationships within the literature. The researcher carefully examined the selected

studies to determine how computer technologies are used to support scientific innovation, research efficiency, and the commercialization of scientific discoveries.

During the analysis process, the information obtained from different sources was organized into key thematic areas, including:

i. Computer applications in scientific research
ii. Technological innovations in applied and natural sciences
iii. Emerging business opportunities in science-based industries
iv. The role of digital tools in improving research efficiency
v. The commercialization of scientific discoveries

By organizing the information into these themes, the researcher was able to compare findings from different studies and highlight common ideas and trends within the literature.

Results and Discussion

The integration of computer technology into applied and natural sciences has significantly expanded the range of opportunities for innovation and the development of science-based business ventures. Computers have become essential tools in modern scientific research because they allow scientists to process large amounts of data, simulate complex systems, automate experiments, and develop technological solutions to real-world problems. As a result, many scientific discoveries are increasingly being translated into commercial products and services that contribute to economic growth and technological advancement.

In the fields of chemistry and biochemistry, computer technology plays an important role in molecular modeling, chemical analysis, and drug discovery. Molecular modeling software allows scientists to study the structure and behavior of molecules using computational techniques. By simulating molecular interactions and chemical reactions, researchers can predict the properties of new compounds and identify potential drug candidates before conducting laboratory experiments. This significantly reduces research costs and accelerates the drug development process. Pharmaceutical companies rely heavily on computer-based systems for drug design, chemical analysis, and quality control during the production of medicines. Similarly, chemical manufacturing industries use computer technologies to optimize production processes, monitor chemical reactions, and ensure safety and efficiency in industrial operations.

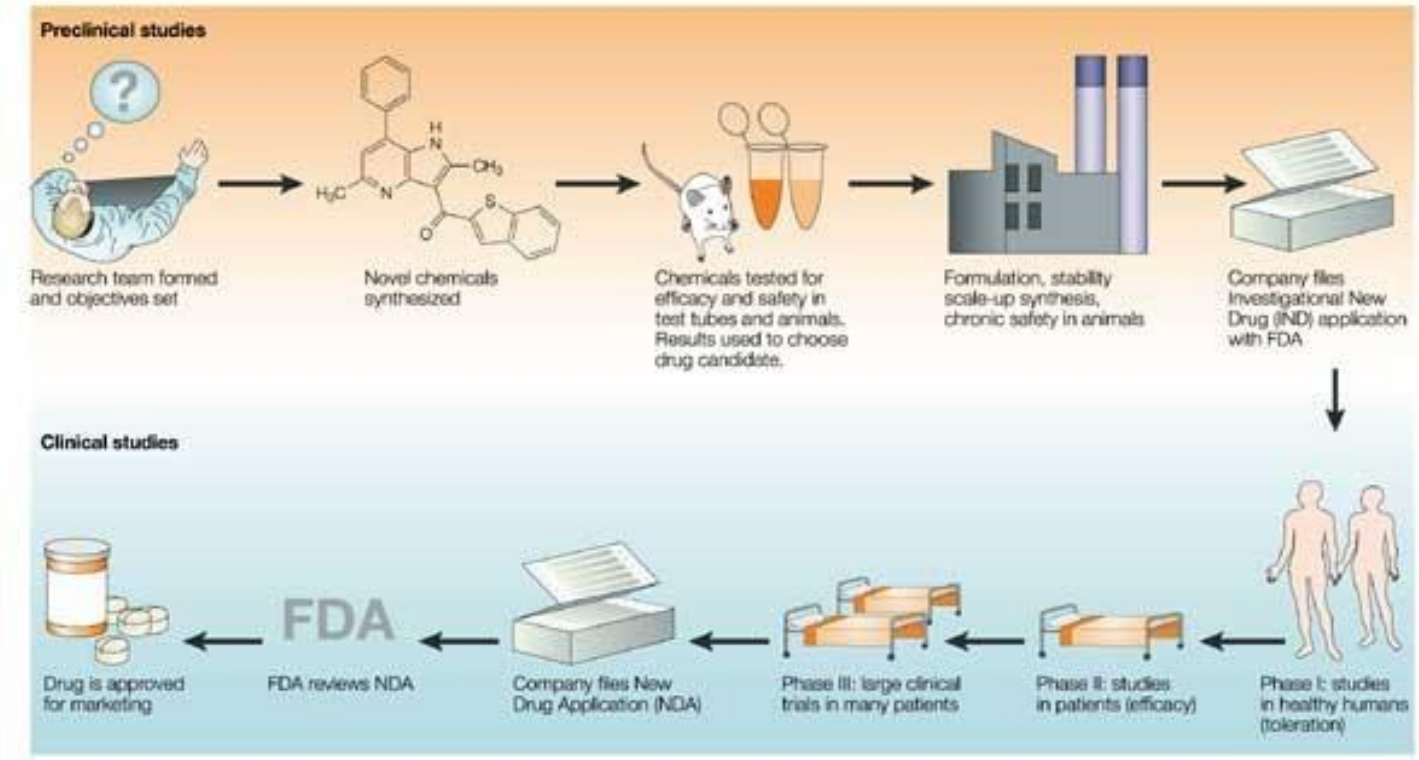


Figure 3: Showing Simulating Molecular Interactions and Chemical Reactions (https://www.google.com)

In physics, computer simulations and numerical modeling have become essential tools for studying complex physical systems. Many physical phenomena such as fluid dynamics, electromagnetic fields, energy generation, and material behavior are difficult to analyze using traditional experimental methods alone. Computer simulations allow scientists and engineers to model these processes and test different design scenarios without the need for expensive prototypes or large-scale experiments. These computational techniques support innovations in engineering, renewable energy development, aerospace technology, and electronics manufacturing. Businesses that specialize in engineering simulation software, energy system design, and technological consulting have emerged from these advancements.

Mathematics and statistics also play a critical role in supporting computer-based business ventures. Mathematical algorithms and statistical models are widely used in areas such as financial forecasting, business intelligence, risk management, and decision-making processes. With the growth of digital data across industries, the demand for data analysis and predictive modeling has increased significantly. Professionals trained in mathematics, statistics, and computer science develop algorithms and analytical tools that help organizations interpret complex datasets and identify patterns or trends. This has led to the rapid expansion of businesses in data science, artificial intelligence, machine learning, and financial technology (fintech). These industries rely heavily on computational methods to develop intelligent systems capable of solving complex problems.

Computer science itself serves as the foundation for many modern technology-based businesses. Software development, artificial intelligence systems, cloud computing platforms, and cybersecurity solutions are all products of computer science innovations. Software companies design applications that support scientific research, industrial operations, healthcare management, financial services, and communication technologies. Artificial intelligence systems are increasingly used in areas such as medical diagnosis, automated manufacturing, customer service, and environmental monitoring. Cybersecurity firms also play a crucial role in protecting digital information systems from cyber threats, which is essential for organizations that depend on digital infrastructure.

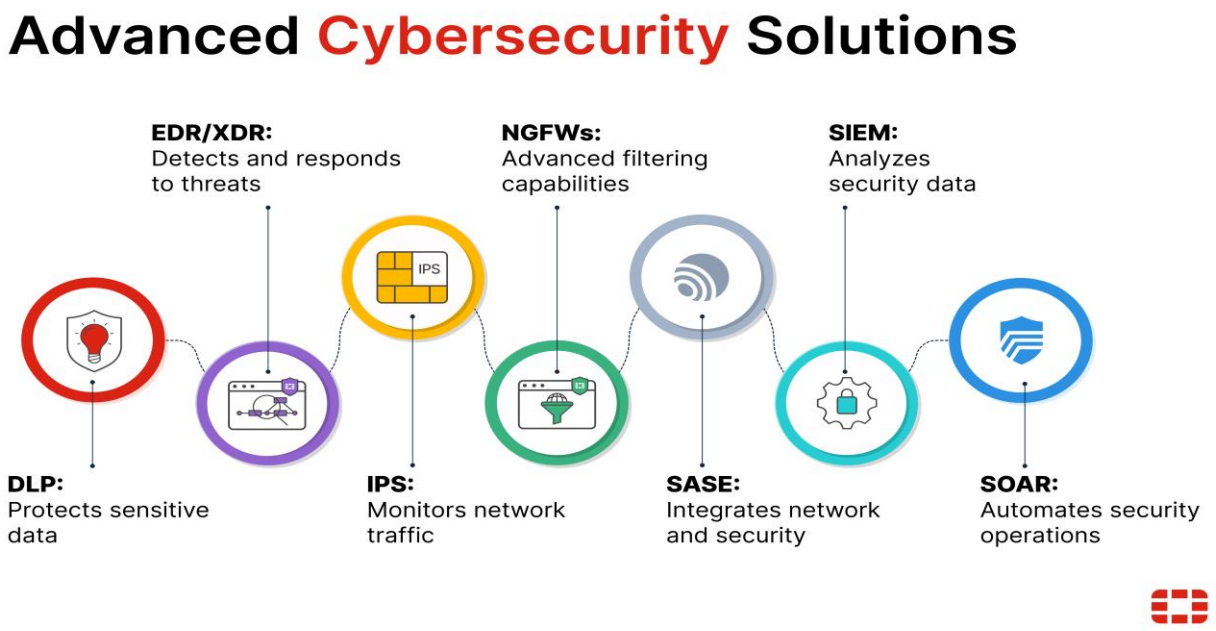


Figure 4: Showing the Advanced Cyber Security Solutions (https://www.google.com)

In microbiology and biotechnology, computer technology has revolutionized the way biological data is collected, analyzed, and interpreted. Bioinformatics tools enable scientists to analyze genetic sequences, study protein structures, and understand biological processes at the molecular level. These computational tools are essential for modern medical research, particularly in the development of vaccines, genetic therapies, and personalized medicine. Automated laboratory systems also allow researchers to conduct

experiments more efficiently by using computer-controlled instruments for data collection and analysis. These technological innovations have contributed to the establishment of biotechnology startups, pharmaceutical companies, and diagnostic laboratories that provide medical testing, genetic analysis, and biotechnology services.

The impact of computer technology is also evident in plant sciences and agricultural biotechnology. Modern agriculture increasingly relies on digital technologies such as precision agriculture, satellite imaging, drones, and crop monitoring systems. These computer-based technologies enable farmers and agricultural scientists to monitor soil conditions, crop health, weather patterns, and pest activity in real time. By analyzing this data, farmers can optimize irrigation, fertilizer application, and pest control strategies, leading to increased crop productivity and reduced environmental impact. Agricultural biotechnology companies also use computer-based genetic analysis tools to develop improved crop varieties that are resistant to diseases, pests, and environmental stress. These innovations have created business opportunities in agricultural technology, farm management software, and agribusiness consulting.



Figure 5: computer-based technique and agricultural scientific monitoring soil conditions, crop health, weather patterns, and pest activity in real time (https://www.google.com).

In geology and environmental biology, computer technologies such as Geographic Information Systems (GIS) and remote sensing have become indispensable tools for studying the Earth's surface and environmental systems. GIS allows scientists to collect, analyze, and visualize spatial data related to land use, geological formations, mineral deposits, and environmental changes. Remote sensing technologies use satellite imagery, drones, and aerial photography to gather environmental data over large geographic areas. These tools help scientists monitor deforestation, track climate change, assess natural disasters, and manage natural resources more effectively.

As a result of these technological capabilities, numerous businesses have emerged in areas such as environmental consulting, mineral exploration, disaster risk assessment, and waste management. Environmental consulting firms provide services such as environmental impact assessments, pollution monitoring, and ecological conservation planning for governments and private industries. Companies specializing in mineral exploration use GIS and remote sensing technologies to identify potential mining sites and manage resource extraction projects.

Overall, the integration of computer technology into applied and natural sciences has greatly enhanced the efficiency, accuracy, and scalability of scientific research and industrial processes. Computers allow scientists to analyze complex problems, conduct advanced simulations, and manage large volumes of data more effectively than traditional methods. These capabilities make it possible for researchers and entrepreneurs to transform scientific knowledge into practical solutions that address societal challenges.

Furthermore, the growing collaboration between scientists, engineers, and technology professionals continues to drive the development of innovative products and services across multiple industries. As computer technologies continue to evolve, their role in supporting scientific entrepreneurship and technology-based business ventures is expected to become even more significant. By enabling faster research, improved decision-making, and more efficient production processes, computers have become essential tools for converting scientific discoveries into sustainable and profitable enterprises.

Conclusion

The review highlights the significant role that computer technology plays in transforming scientific knowledge into practical business opportunities across various applied and natural science disciplines. As scientific research becomes more complex and data-driven, computers have become indispensable tools for researchers, scientists, and entrepreneurs. Digital technologies enable scientists to conduct advanced data analysis, perform simulations, automate laboratory processes, and develop innovative solutions that address real-world problems.

Across disciplines such as chemistry, physics, mathematics, statistics, biotechnology, microbiology, geology, plant sciences, and environmental biology, computer applications have improved research efficiency, accuracy, and productivity. Technologies such as computational modeling, bioinformatics, statistical computing, Geographic Information Systems (GIS), and laboratory automation allow researchers to analyze large datasets, predict experimental outcomes, and accelerate scientific discovery. These capabilities have made it easier to convert scientific findings into commercial products and services.

Furthermore, the integration of computer technology with scientific research has led to the emergence of numerous technology-driven enterprises. Businesses in areas such as pharmaceutical development, biotechnology, data analytics, environmental consulting, agricultural technology, and scientific software development are increasingly relying on digital tools to support innovation and operational efficiency. These science-based businesses contribute to economic development by creating employment opportunities, promoting technological advancement, and supporting sustainable industrial growth. In addition, computer technology facilitates collaboration and knowledge sharing among researchers, industries, and institutions across the world. Digital platforms and data-sharing systems allow scientists to work together more effectively, accelerating innovation and expanding the impact of scientific research. As a result, the relationship between scientific knowledge and computer technology continues to strengthen the development of modern knowledge-based economies.

Overall, the findings of this review demonstrate that computer applications are essential in bridging the gap between scientific research and commercial enterprise development. By enabling advanced research techniques and supporting technological innovation, computers have become powerful tools for transforming scientific ideas into profitable and sustainable business ventures.

Recommendations

Based on the findings of this review, several recommendations can be made to further promote the development of business ventures in applied and natural sciences through the effective use of computer technology.

First, educational institutions should integrate entrepreneurship education and digital technology training into science-related academic programs. Students studying applied and natural sciences should be equipped not only with scientific knowledge but also with skills in computer programming, data analysis, innovation management, and business development. This will help prepare future scientists and researchers to transform their scientific ideas into viable business opportunities.

Second, governments and policymakers should create supportive environments that encourage scientific innovation and technology-based entrepreneurship. This can be achieved by providing research funding, innovation grants, and financial support for startups that focus on science and technology development.

Establishing science and technology parks, research centers, and innovation hubs can also help bridge the gap between academic research and industrial commercialization.

Third, private sector organizations and investors should collaborate with academic institutions and research laboratories to support the commercialization of scientific discoveries. Partnerships between universities, research institutions, and industries can help translate research findings into marketable products and services. Such collaborations can also promote knowledge transfer, technological advancement, and the development of new industries.

Fourth, interdisciplinary collaboration should be encouraged among scientists, computer experts, engineers, and business professionals. Modern scientific challenges often require expertise from multiple fields, and collaborative approaches can lead to more innovative and practical solutions. By combining scientific knowledge with computing skills and business strategies, researchers can develop sustainable and scalable technology-based enterprises.

There is a need to promote continuous research and investment in digital technologies that support scientific innovation. Advances in areas such as artificial intelligence, big data analytics, cloud computing, and automation will continue to shape the future of scientific research and entrepreneurship. Encouraging the adoption of these technologies across scientific disciplines will help maximize their potential for economic and technological development.

In conclusion, strengthening the integration of computer technology with applied and natural sciences is essential for fostering innovation, scientific entrepreneurship, and sustainable economic growth. By supporting education, collaboration, and technological development, societies can fully harness the potential of science and digital technologies to create new business opportunities and improve the quality of life.

References

Altman, R. B., & Mooney, S. D. (2019). Data-driven approaches in computational biology. *Annual Review of Biomedical Data Science, 2*, 1–21. https://doi.org/10.1146/annurev-biodatasci-011518-040320

Batty, M. (2018). *The new science of cities*. MIT Press.

Bengio, Y., Courville, A., & Goodfellow, I. (2016). *Deep learning*. MIT Press.

Chen, H., Chiang, R. H. L., & Storey, V. C. (2012). Business intelligence and analytics: From big data to big impact. *MIS Quarterly, 36*(4), 1165–1188.

Choudhury, A., & Khanna, M. (2020). Computational methods in chemistry: Applications in drug discovery. *Journal of Computational Chemistry, 41*(15), 1312–1325.

Davenport, T. H., & Harris, J. G. (2017). *Competing on analytics: The new science of winning* (Updated ed.). Harvard Business Review Press.

Fang, Y., & Zhan, Y. (2020). Applications of bioinformatics in vaccine development. *Frontiers in Genetics, 11*, 556. https://doi.org/10.3389/fgene.2020.00556

Goh, S., & Goh, H. (2018). Role of artificial intelligence in precision agriculture. *Computers and Electronics in Agriculture, 153*, 69–81.

Gupta, P., & Singh, R. (2019). Laboratory automation and robotics in biotechnology. *Biotechnology Advances, 37*(7), 107449.

James, G., Witten, D., Hastie, T., & Tibshirani, R. (2021). *An introduction to statistical learning* (2nd ed.). Springer.

Jensen, F. (2017). *Introduction to computational chemistry* (3rd ed.). Wiley.

Laudon, K. C., & Laudon, J. P. (2018). *Management information systems: Managing the digital firm* (15th ed.). Pearson.

Lesk, A. M. (2019). *Introduction to bioinformatics* (5th ed.). Oxford University Press.

Li, X., & Zhang, S. (2018). GIS applications in environmental management and planning. *Environmental Monitoring and Assessment, 190*, 52. https://doi.org/10.1007/s10661-017-6378-7

Marr, B. (2021). *Data strategy: How to profit from a world of big data, analytics and AI*. Kogan Page.

OECD. (2019). *Innovation and technology policies: Promoting digital entrepreneurship*. OECD Publishing.

Raghupathi, W., & Raghupathi, V. (2014). Big data analytics in healthcare: Promise and potential. *Health Information Science and Systems, 2*(3). https://doi.org/10.1186/2047-2501-2-3

Steinhauser, M. L., & Beliveau, B. J. (2018). Computational tools for chemical synthesis design. *Chemical Reviews, 118*(17), 8890–8950.

Turner, S., & Rees, R. (2019). Entrepreneurship in biotechnology: Strategies for innovation. *Journal of Commercial Biotechnology, 25*(3), 15–27.

Wang, J., & Wang, X. (2017). Remote sensing applications in environmental monitoring. *ISPRS Journal of Photogrammetry and Remote Sensing, 134*, 1–18.

Davenport, T. H., Guha, A., Grewal, D., & Bressgott, T. (2020). How artificial intelligence will change the future of marketing. *Journal of the Academy of Marketing Science, 48*, 24–42.

Kotu, V., & Deshpande, B. (2023). *Data science: Concepts and practice* (3rd ed.). Morgan Kaufmann.

Sarker, I. H. (2022). AI-based modeling: Techniques, applications and research issues. *SN Computer Science, 3*(2), 1–21.

Sharma, S., & Gupta, P. (2021). A survey of AI-based data analytics approaches. *International Journal of Information Management Data Insights, 1*(2), 100017.