

Leveraging AI in R&D: New Opportunities and Challenges

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The use of Artificial Intelligence (AI) technologies in business operations can significantly impact how companies qualify for and benefit from R&D tax credits.

Artificial Intelligence (AI) is one of the world's greatest technological tools. Its greatness is derived from its general-purpose applicability and capabilities. Two general categories the tool excels at are in increasing the efficiency and effectiveness of processes and the development and innovation of products, processes, and services. AI is the perfect co-pilot tool for the well-informed and well-educated human, according to The University of Illinois Chicago, which defines AI as a sector of computer science dedicated to creating machines capable of executing tasks that normally require human intelligence. These tasks encompass learning from experience (via machine learning), understanding natural language, pattern recognition, problem-solving, and decision-making. AI's influence permeates our daily lives, from autonomous vehicles to virtual assistants, constantly growing in importance and reshaping various aspects of our daily lives.

AI has become a transformative force across various industries, driving efficiency, innovation, and competitive advantage in creating or improving products or services. This new generation of AI tools are active participants in our lives, making significant decisions and driving social and economic results. There has been a surge of companies improving their technological capabilities through AI over the past few years. Organizations have started to develop new ways of working, utilizing personnel, running daily operations, and innovating. There are five domains of AI. These include: Machine Learning, Deep Learning, Natural Language Processing, Computer Vision, and Data Science. Examples of AI applications include expert systems, natural language processing (NLP), speech recognition, and machine vision.

AI's ability to analyze large datasets, check for combinations not previously considered, and exponentially accelerate drug design and discovery is revolutionizing

various sectors. In manufacturing, designs that optimize competing parameters, such as strength, weight, and cost, are optimized while simultaneously performing other tasks that would take too long for humans or traditional manufacturing to model out and perform. With AI these tasks are now completed in seconds.

The increased adoption of AI not only automates business processes and minimizes human error, but also enables companies to reinvent themselves. Despite these advancements, companies continue to face challenges including setting the strategy, structuring teams, reimagining business as usual, and adapting for organizational and technological change.

INDUSTRIES IMPACTED BY AI

AI is revolutionizing numerous sectors through applications that range from automating routine tasks to providing advanced analytics and insights. Below are some key industries where AI is making a substantial impact:

Health Care Treatments and Administration. As of today, AI is primarily utilized to increase speed and accuracy in healthcare. Some current uses of AI include:

- **Diagnosing Patients:** AI algorithms analyze medical images, such as X-rays, MRIs, and CT scans, to assist healthcare professionals arrive at more accurate and quicker diagnoses.
- **Transcribing Medical Files:** Speech Recognition technology uses machine learning models to convert spoken language into written text, allowing for a more efficient and accurate method for recording medical information.

- **Automating and Improving Administrative Work:** AI streamlines administrative work, such as automating billing, scheduling patients more efficiently, and improving overall operational efficiency within healthcare organizations.

Pharmaceutical. Artificial intelligence in the pharmaceutical industry is used in various applications, including drug discovery, clinical trials, and supply chain optimization. In addition to improving efficiency and accuracy of the above-mentioned processes, these applications allow for a more personalized approach in medicine.

Drug Discovery. AI's largest contribution in pharma is in drug discovery, as it expedites the identification of new potential drugs and improves molecular modeling. Through the study of biological data, AI helps in predicting the efficacy and safety profiles of drugs. Normally, these processes (discovering a potential drug, conducting tests, clinical trials, getting approval from the FDA to use on patients, etc.) take years to complete.

Clinical Trials. AI applications expedite various clinical trial processes. For instance, patient recruitment can be accelerated by AI analyzing datasets of potential patients and identifying suitable candidates. AI can also optimize trial design and monitor data in real-time by analyzing large datasets. This capability shows that AI can learn to predict patient response and treatment efficacy, when training it to use historical data.

Supply Chain Optimization. AI utilization in Supply chain optimization can allow for more accurate forecasting, the efficient management of inventory, the improvement

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of production schedules, and the streamlining of more cost-effective operations.

Commercial Transportation. The use of Artificial Intelligence technologies, such as machine learning within the commercial airline industry, has driven improved airline operations. It has resulted in better customer service, predictive airplane maintenance, and enhanced aircraft components manufacturing.

Airlines are also leveraging AI for dynamic ticket pricing. Dynamic pricing is a technique of adjusting prices based on a supply-demand evaluation at a point in time with the objective of optimizing profitability. Pricing algorithms is an example of a well-established AI-based application, utilizing intelligent solutions like machine learning and big data analysis that incorporate departure/arrival times, destination, distance, and number of seats available by each cabin type.

Game Development. The gaming industry has grown to more than \$300 billion and is one of the largest markets leading the development of AI. Developers in this industry continuously work on developing a more adaptive and immersive gaming experience by understanding user behavior, presenting the stories dynamically with more realistic looking characters, personalizing the gaming experience, detecting bugs, and more. The AI applications that developers create and discover can allow them to enter other industries where those technologies can be of use.

Accounting, Taxation and Finance. AI is becoming an integral part of accounting and finance. It streamlines processes, improves efficiency, and enhances audit practices. AI analyzes vast amounts of structured and unstructured data, identifying anomalies based on patterns. These models can be fine-tuned for sensitivity, considering client-specific risk profiles. Additionally, AI automates manual tasks like reconciliations, financial statement calculations, and compliance documentation. It even evaluates historical risks and industry trends to predict risks in current engagements.

Within tax-related tasks, AI models excel at automating data entry from various sources, including tax forms, invoices, and receipts. Algorithms identify potential risk areas by analyzing data patterns

and relationships in financial statements, resulting in a lower error rate. Furthermore, AI provides tailored tax planning ideas and insights based on clients' unique financial situations.

AI is gaining popularity, leading to a surge in companies seeking R&D tax credits for their AI initiatives. However, businesses are uncertain about the eligibility of their activities and projects for this tax incentive.

In finance, AI plays a crucial role in risk management. It processes extensive data under different models and conditions to assess risk levels. Additionally, AI extracts key information from emails, memos, and meeting minutes, helping track potential deals and essential terms. The software also monitors covenant levels and other critical metrics using projected company performance and deal data.

AI'S IMPACT ON R&D TAX CREDITS

The use of AI technologies in business operations can significantly impact how companies qualify for and benefit from R&D tax credits. AI is gaining popularity, leading to a surge in companies seeking R&D tax credits for their AI initiatives. However, AI, due to its complicated nature, and the detailed qualification criteria of the tax rules, cause businesses to be uncertain about the eligibility of their activities and projects for this tax incentive.

HOW DO YOU QUALIFY FOR THIS INCENTIVE?

For an AI project to be eligible for R&D tax credits, it must possess technological challenges or uncertainties. Fortunately, as discussed above, there are many areas in a wide variety of industries where AI is becoming more prevalent. As a result of significant advances in the applicability and integration of AI within industry, qualifying for R&D tax credits warrants a close look. So, how does one evaluate, capture, and document this incentive?

WHAT QUALIFIES?

Many products, processes, technology innovations, and improvements unique to the AI industry are eligible for R&D tax credits, including:

- Design and/or development of new software
- Design of new system architecture
- Design of database management systems
- Programming or optimization of code for product performance issues
- Development of new features or integration with new platforms or operating systems
- Development and training of new mathematical and/or computer models
- Testing of software and model performance

For example, Machine Learning (ML) allows software applications to predict outcomes more accurately without being specifically programmed to do so. It falls under an AI category that qualifies for the R&D tax credits. Its algorithms use historical data as input to predict new output values. Software utilizing ML can use large datasets to perform tasks and provide results that would otherwise not be attainable or attainable within reasonable timeframes. AI projects often span multiple spheres including data analysis, algorithm development, and system integration, thereby significantly increasing the universe of activities that can qualify for the R&D tax credit.

HOW DOES THE R&D TAX CREDIT WORK? WHAT AI EXPENSES CAN BE INCLUDED IN CALCULATING THE R&D TAX CREDIT?

The R&D tax credit is available for taxpayers who incurred expenses for qualified research activities (QRAs) that were conducted in the U.S. The credit is mainly composed of the following qualified research expenses (QREs):

- Internal salaries paid to employees for qualified services
- Supplies used and consumed in the R&D process
- Contract research expenses (an expense where a vendor or someone other than an employee of the

company performs QRAs on behalf of the company)

Section 41 of the Internal Revenue Code (IRC) allows companies that develop AI software with the purpose of developing or improving the design and/or capability of their software to claim specific R&D credit software development tax incentives. These incentives can help companies offset their qualified research expenses (QREs). QREs that could qualify for the tax credit include:

- Salaries
- Supplies
- Cloud computing costs
- Contract research

Employees earning salaries for performing qualifying research activities are usually one of the largest contributors of QREs of a software research and development tax credit claim. Employees who generate and/or utilize simulations, tests, or models to resolve technical uncertainties, as well as employees who evaluate technological alternatives for these simulations and models, can have their time included when calculating R&D tax credits for software development. Here's how AI affects the eligibility and benefits of these tax credits:

Companies Developing AI technology:

- *Employee Wages:* Salaries of data scientists, machine learning engineers, and other staff involved in AI development are considered qualifying research expenditures (QREs).
- *Software and Hardware Costs:* Expenses related to AI software tools, cloud computing resources, and specialized hardware for AI training and deployment are eligible.
- *Contract Research:* Payments to third-party contractors for AI research and development can be included as QREs.

Product Innovation:

- When AI-driven innovation overcomes significant technical challenges, it may meet the criteria for qualified research activities: technological in nature, elimination of uncertainty, process of experimentation, and qualified purpose.

Computer and Mathematical Modeling and Industry Applications:

AI projects are complex in nature and require data analysis, algorithm

development, and system integration, which increases the number of activities that can qualify for the R&D tax credit.

Other individuals, such as contractors based in the United States who perform the activities mentioned above, or who support and supervise staff who conduct research and development activities, may also have expenses that can be included.

Many products, processes, technology innovations, and improvements unique to the AI industry are eligible for R&D tax credits.

For an activity to qualify for the research credit, the taxpayer must show that it meets the following four tests:

- The activity must rely on the principles of hard science, such as engineering, computer science, biological science, or physical science.
- The activities must relate to the development of new or improved product or process intended to improve functionality, performance, reliability, or quality features.
- Technological uncertainty must exist at the outset of the development activities. Uncertainty exists if the information available at the outset of the project does not establish the capability or methodology for developing or improving the business component or the appropriate design of the business component.
- A process of experimentation (e.g., an iterative-testing process) must be conducted to eliminate the technological uncertainty. This includes assessing a design through modeling, proof-of-concept, computational analysis, or trial-and-error testing.

OTHER CONSIDERATIONS

Start-Up Benefits. For start-up businesses with gross receipts in fewer than five years and gross receipts lower than \$5 million in the current year, the R&D tax credit can be utilized to offset payroll taxes. Companies can utilize the payroll tax credit to offset up to \$500,000 in Social Security and

Medicare taxes for up to five years, with a maximum benefit of \$2,500,000.

Section 174 Implications. For years beginning before December 31, 2021, taxpayers could choose to immediately expense their R&D expenditures or to treat these expenditures as deferred expenses and amortize them over a period of at least 60 months. For tax years beginning after December 31, 2021, taxpayers no longer have the option to deduct R&D expenditures currently and are required to charge them to a capital account and amortize over five years (15 years for foreign research expenditures) beginning from the midpoint of the tax year in which the expense was incurred.

Section 174 expenses are much broader in scope than those of Section 41 (R&D tax credit) expenses, which presents the primary challenge for taxpayers. Section 174 eligible expenditures include all costs (foreign and domestic) incidental to product development/improvement, including:

- Direct R&D costs (wages, supplies, and contract research)
- Indirect R&D costs (overhead, utilities, rent, depreciation, patent fees, etc.)
- All software development costs (internal or external use)

As a result of these changes to Section 174, taxpayers will need to evaluate the impacts to their estimated tax payments and quarterly tax provision calculations to prevent underpayment and interest penalties.

CONCLUSION

AI plays an important role in advancing various industries by enhancing efficiency, accuracy, and innovation. Adopting, integrating, and launching of this technology is still difficult for many businesses, as they are not clear on how to best deploy AI and how to go about achieving desired goals. This is gradually improving. The significant research and development efforts required to create and implement AI technologies often qualify for R&D tax credits, providing substantial financial benefits to companies. At the federal level, the R&D credit carries forward for up to 20 years, so taxpayers without immediate use may still benefit from claiming a credit and carrying it forward to future tax years. Additionally, many states offer state R&D tax credits to companies developing AI technology

besides those credits already obtained at the federal level.

By leveraging these tax incentives, businesses can offset the costs of their AI initiatives, refuel further innovation, and continue to hold a competitive edge in their respective industries. Companies developing AI technologies that would like to potentially claim the research credit need to record and keep detailed documentation of their research expenditures, processes, experiments, and outcomes to substantiate their R&D tax credit claims. Understanding the relationship between AI development and the R&D tax credit can help companies maximize the financial rewards of their technological advancements.

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