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LITERATURE REVIEW

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The impact of machine learning and artificial intelligence on business process reengineering in the digital era

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ABSTRACT

The fast growth of Machine Learning (ML) and Artificial Intelligence (AI) has greatly changed the way companies plan, control, and improve their work steps in the digital age. Firms are under growing demand to boost their efficiency, flexibility, and decision-making. ML and AI tools have become important parts of Business Process Reengineering (BPR). This paper looks at the role of ML and AI in business process reengineering by studying how data-driven plans help automation, forecast analysis, and smart decision-making in the main areas of a company. The paper discusses applied machine learning techniques that are increasingly implemented in current business landscapes. This involves supervised learning, predictive modelling, and pattern recognition. The said techniques allow firms to restructure their standard practices by reducing human input as well as eliminating operational lags, hence raising the total efficiency of the process. Moreover, these systems heighten business activities through instant observation of anomalies in addition to flexible process improvement grounded on perpetually changing data. This study takes an application view and merges recent advances in the application of ML and AI towards business process improvement and reengineering. These include operational efficiency, cost reduction, enhanced customer experience, and strategic decision support. The paper outlines how ML-based predictive modelling assists organizations in such areas as demand forecasting and resource allocation optimization as well as process bottlenecks identification that can be addressed through AI-based automation of faster and more accurate execution of both routine as well as complex tasks. They found that firms using ML and AI technologies in business process reengineering get greater process agility, enhanced consistency of performance, and strength in resilience when going digital.

KEY WORDS

Machine learning; Artificial intelligence; Business process reengineering; Digital transformation; Process optimization; Applied machine learning

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Introduction

The digital age has fundamentally changed the way organizations can run their businesses, participate in competition, and deliver value to customers. The surge in computing strength, information, and connectivity makes it possible for firms to carry out digital transformations on their activities and re-engineer classic process flows. Organizations are becoming more dependent on facts in their strategies; thus, there is a compelling urge to make business operations more effective, elastic, and smart. This eventually places Machine Learning (ML) and Artificial Intelligence (AI) as five basic technologies that enable automation, predictive analytics, and intelligent decision-making capabilities over quite an extensive functional business area.

Business Process Reengineering is the fundamental rethinking and radical redesign of enterprise processes to bring dramatic improvement in critical, contemporary measures of performance such as cost, quality, service, and speed. With greater usage of information technology for streamlining activities and eliminating wastage from operations, the concept of BPR became very prominent [1]. Traditionally initiated through managerial analyses and rule-based information systems, such approaches can indeed improve processes but are generally constrained by static models and cannot respond to rapid changes in business environments. The challenges of the digital age call for more dynamic and intelligent approaches in process redesign.

Machine learning and artificial intelligence go far beyond the classic concept of business process reengineering. ML techniques enable systems to learn from both historical and real-time data, discover hidden patterns, and develop predictive insights without the necessity of any explicit programming instructions. AI extends these capabilities by providing intelligent automation support, reasoning, and adaptive decision-making. ML and AI enable the redesign of business processes in such a manner that requires not merely their automation but rather assimilating capabilities for learning and improving continuously. The transformation leads to managing processes intelligently based on data rather than rules.

Greater amounts of data, infrastructural computation advancements, and a heightened need for agility in operations have led to the sprouting infusion of ML and AI within business processes. At present, there is a huge availability of structured and unstructured data by organizations through systems usage, customer communication channels, sensors, and digital platforms. Tasks, including the achievement of better accuracy in forecasting demand, improved customer segmentation, risk evaluation, and performance optimization can be assisted by these ML models. Even further support in process realization is achieved through real-time monitoring that identifies anomalies as well as instant reactions to dynamic situations delivered by intelligent applications.

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In the age of digitalization, uncertainty, speed of market changes, and high demands from customers are some factors that organizations have to manage. Organizations need to manage disruptions, optimize resource usage, and maintain a steady level of good quality-of-service delivery. Predictive and proactive process design as enabled through ML- & AI-supported business process reengineering, will allow dynamic adjustment in the workflows of organizations whenever there is a predicted change in demand or bottlenecks in operations. The reduced manual effort also reduces mistakes, hence speeding up the process and making it more reliable; an organization becomes faster and more resilient.

Recent studies underscore the fact that AI technologies are increasingly being used to solve actual business problems rather than remaining at the level of experiments. As noted by [2], in practical implementation within organizations, AI is being used for the automation of mundane tasks, support in making informed decisions, and discovery from data. All these directly correspond to the immediate intentions of business process reengineering, which is to redesign processes so that they perform better and become more strategically aligned. Thus, ML and AI infusion into BPR initiatives can take a firm beyond making small strides toward achieving significant and sustainable transformation [2].

The challenges of ML and AI in business process reengineering are equally significant as their advantages. Organizations face problems of data quality and integration, as well as model interpretability, which most organizations face when implementing machine learning. Since business processes cut across various departments and systems, getting consistent and accurate data is impossible. Also, if the artificial intelligence output is not transparent and understandable to the decision-makers, they would be reluctant to base their decisions on it. The above challenges further reiterate the need for pragmatism in the redesign of business processes through the implementation of ML and AI.

One more very important aspect is the realignment of intelligent technologies with organizational goals and human expertise. Business process reengineering is not solely a technical exercise but involves organization change, stakeholder engagement, and strategic planning. ML and AI systems have to be designed in such a way that they complement human decision-makers rather than replace them fully. When rightly integrated, intelligent systems can augment human capabilities by delivering the right insights at all times while humans keep control and retain the contextual understanding of the environment. This collaboration is highly appropriate in intricate business environments with a significant infusion of ethical, regulatory, and strategic interests.

Though the existing literature has adequately covered various aspects related to digital transformation and AI-driven automation, a dearth of studies examining the effect that machine learning and artificial intelligence expert on business process reengineering from an applied perspective still prevails. Most studies either dwell on technical algorithm development or take recourse to conceptual moorings; relatively fewer contributions have dealt with how ML and AI are being practically used in redesigning end-to-end business processes for organizational performance improvement. This gap speaks volumes about the need for research with real-world relevance, practical benefits, and implementation considerations. This study discusses the influence of machine learning and artificial intelligence on business process reengineering in this digital era. It therefore tries to establish how ML and AI assist in automating processes, supporting predictive analytics, and intelligent decision-making within redesigned business workflows. The discussion is based on an appraising perspective about the practical role that ML and AI can play towards enhancing process efficiency, flexibility, and performance. The findings pragmatically mapping out how intelligent technologies could be construed as enablers of effective business process reengineering offer a guiding compass to organizations seeking to unshackle tussles with ML & AI as appendages of their digital transformation strategies.

This study emphasizes the practical role of machine learning and artificial intelligence in enabling data-driven business process reengineering and highlights their importance for organizations operating in digitally intensive environments.

Literature Review

The growing adoption of Machine Learning (ML) and Artificial Intelligence (AI) has become a popular topic in scholarly research as well as business practice under the broader theme of digital transformation. Business Process Reengineering (BPR), which originally was redesigning core business processes for better performance, increasingly takes place in parallel with the evolution of intelligent technologies. While early BPR literature gave much attention to how information systems could be used to create better workflow arrangements by cutting out inefficiencies, recent works show that BPR can be dynamically redesigned using the abundant data that ML and AI constantly analyze and interpret.

Another stream falls under the study of how organizations use AI technologies to automate and optimize their business processes. Specifically, these can be seen from the practical viewpoint described by Davenport and Ronanki on how firms implement AI in automating routine tasks, augmenting human decision-making, and mining large datasets for more insight. Thus, automation driven by AI demonstrates that it plays an important role in attaining better operational efficiency and reducing manual effort involved in business processes like customer service, finance, and supply chain operations. These are very much related to the contemporary objectives of BPR, wherein performance improvement is driven through automation and intelligence [2].

Predictive analytics for business process optimization are another area where machine learning has received considerable attention. Among the supervised learning algorithms that find common application in modelling demand, identifying bottlenecks within the process, and associated risk with operations are regression, decision tree, and ensemble methods. According to Wamba et al., this is made possible through data analytics and ML techniques whereby firms use historical as well as real-time data to redesign their decision-intensive processes. The results indicate that the predictive ability of ML models helps in pre-emptively adjusting the processes to make them more efficient and responsive [3].

Another significant strand of research is the exploration of how ML and AI can assist process monitoring and continuous improvement. Typically, process monitoring depends on pre-set rules and key performance indicators that may not fully reflect intricate or changing patterns. The gap is filled by AI-enabled process mining and anomaly detection by learning from event logs and operational data; studies falling within this domain validate that ML-based process analysis assists

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organizations to unearth concealed inefficiencies, deviations, and noncompliance within business workflows. Thus, informed reengineering decisions are supported for even better continual refinement of the process.

The integration of AI into decision support systems has also received considerable attention in the literature. AI-driven decision support tools enhance BPR initiatives by providing recommendations based on predictive and prescriptive analytics. According to Shrestha et al., AI systems are most effective when they complement human expertise rather than fully replace it. Their research emphasizes the importance of human–AI collaboration in business processes, particularly in complex decision-making scenarios. This collaborative approach is especially relevant for BPR, where organizational knowledge and strategic judgment remain critical [4].

Recent studies further explore how ML and AI contribute to business process resilience and adaptability in digitally intensive environments. As organizations operate in volatile and uncertain conditions, the ability to redesign processes that can quickly adapt to change has become increasingly important. ML models enable scenario analysis and forecasting, allowing businesses to test alternative process designs and anticipate future challenges. AI-driven automation supports faster execution and recovery by reducing dependency on manual intervention. These capabilities are particularly valuable for organizations undergoing large-scale digital transformation initiatives [5].

Despite the demonstrated benefits, the literature also identifies several challenges associated with applying ML and AI in business process reengineering. Data quality and availability remain major concerns, as ML models heavily depend on reliable and representative data. Inconsistent or incomplete data can limit model accuracy and reduce trust in AI-driven recommendations. Additionally, the interpretability of ML models has emerged as a critical issue, particularly in business contexts where transparency and accountability are required. Researchers highlight that explainable AI techniques can help address these concerns by making model outputs more understandable to decision-makers.

Another limitation noted in existing research is the gap between theoretical models and real-world implementation. While many studies propose conceptual frameworks or algorithmic solutions, fewer contributions provide detailed insights into how ML and AI are practically embedded into end-to-end business processes. This gap suggests a need for more application-oriented research that emphasizes implementation strategies, organizational alignment, and measurable process outcomes. Such research is essential for translating technological potential into tangible business value [6].

Overall, the literature indicates that machine learning and artificial intelligence play an increasingly important role in business process reengineering by enabling automation, predictive analytics, and intelligent decision support. Prior studies provide valuable insights into the capabilities and challenges of ML- and AI-driven process redesign; however, there remains a need for research that integrates these perspectives and examines their combined impact on business processes in the digital era. This study builds upon existing work by focusing on applied ML and AI technologies and their practical implications for business process reengineering, addressing both performance improvement and implementation considerations.

Methodology

This study adopts an applied, qualitative–analytical methodology to examine the impact of Machine Learning (ML) and Artificial Intelligence (AI) on Business Process Reengineering (BPR) in the digital era. The primary objective of the methodology is to understand how intelligent technologies are practically used to redesign and improve business processes rather than to develop or test new machine learning algorithms. This approach aligns with the scope of Machine Learning with Applications, which emphasizes real-world adoption, practical relevance, and applied insights.

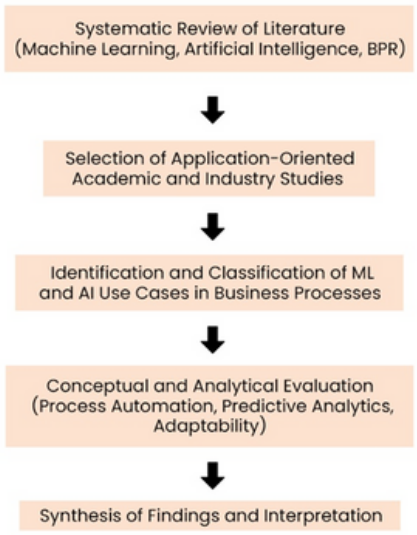

Figure 1. Research methodology flow for ML and AI enabled business process reengineering.

The methodology is designed to capture both the technological and organizational dimensions of ML- and AI-enabled business process transformation. By integrating insights from existing empirical studies, documented applications, and industry-oriented research, the study provides a structured analysis of how intelligent systems support automation, predictive decision-making, and continuous process improvement within reengineered business workflows.

To enhance methodological clarity and transparency, the research methodology is also presented through a conceptual figure. Figure 1 illustrates the overall methodological flow adopted in this study for analysing Machine Learning and Artificial Intelligence–enabled business process reengineering.

Research design

The study takes on the exploratory and descriptive approach, which is considered appropriate in probing into the emerging and developing uses of ML and AI in business process reengineering. Exploratory research enables this paper to spot main trends, areas of applications, and challenges about intelligent process redesign; meanwhile, the description will assist in giving a systematic account of how these technologies are practically implemented.

It does not focus on only one industry or organization but rather adopts a cross-domain perspective, thereby enabling analysis of Machine learning and AI applications in different business functions , operations management , supply-chain

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process, customer services, finance and strategic planning. By taking a look at such assorted applications, common mechanisms through which machine learning and artificial intelligence could fruitfully intervene in business process reengineering BPR across different organizational context come to the force.

Data sources and selection criteria

This study uses secondary data from peer-reviewed academic literature, practitioner-oriented journals, and credible industry reports. The sources were chosen to balance academic rigour with practical relevance. Preference was given to studies that clearly articulate how ML and AI are being leveraged in business processes or business process redesign initiatives.

- The study should involve the application of ML or AI in a real or realistic business context.
- The main focus should be on process-level outcomes: efficiency improvement, cost reduction, decision quality, or adaptability.
- The source should be published in a reputable journal, conference, or industry outlet.

By applying these criteria, the methodology ensures that the analysis is grounded in practical evidence rather than purely conceptual discussions. This approach supports a realistic assessment of how intelligent technologies are currently used in business process reengineering.

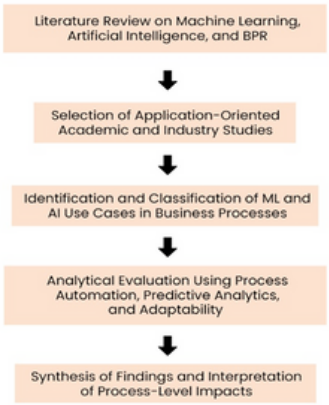

Figure 2. Research methodology flow for ML and AI enabled business process reengineering.

Analytical framework

To guide the analysis, an analytical framework is developed to review ML and AI applications with respect to three interlinked dimensions of business process reengineering.

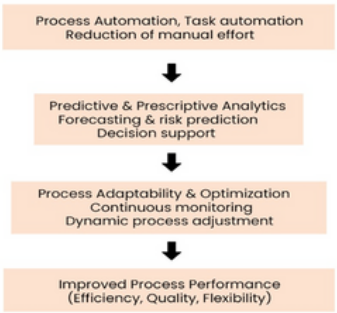

Figure 3. Analytical framework for evaluating ML and AI driven BPR machine learning & AI applications.

The first-dimension reviews process automation and analyses the way in which systems driven by artificial intelligence and tools based on machine learning reduce manual intervention on one hand, and increase the speed as well as ensure accuracy of execution on the other. This embraces simple activity automation, like processing transactions and responding to queries from customers, to somewhat more complicated undertakings reliant on support for decisions based on data.

The second-dimension deals with predictive and prescriptive analytics. In this dimension, ML models are viewed in terms of the future results they can predict, risks they might identify, and proactivity in decision-making, which they can support. Use cases like demand forecasting, workload prediction, and anomaly detection will be discussed to see how insights into the future of the process would inform redesign and planning.

The third-dimension stresses process adaptability and optimization. It reviews how ML, AI allow for the sustenance of learning and improvement by assessing the performance of the process being executed and adjusting workflows as conditions change. Intelligent systems capable of supporting real-time feedback, monitoring performance, and control adaptation are highly applicable in digital-intensive environments.

This framework is applied to the analysis of each application reviewed in this study, thereby ensuring a consistent basis for comparison and synthesis of findings across business domains.

Application-oriented examples

To make things clearer and more useful in practice, it uses examples focused on application taken from existing studies and recorded business practices. These examples show how ML and AI tools help change business methods in real life. For example, predictive models are often used in demand planning to foresee changes and keep stock at the best levels. In the same way, AI customer service tools reshape old support steps by allowing automatic answers and smart routing of customer questions.

Rather than technical implementation details, how these applications influence process structure and decision flow as well as performance outcomes are emphasized in the analysis, thus ensuring an accessible methodology for both academic and practitioner audiences.

Validity and reliability considerations

Several steps are taken to increase the validity and reliability of this study. First is by using information from different independent sources, which minimizes the risk of adopting an individual, biased study. Second is the consistency of patterns obtained in different industries and application contexts, which further strengthens the analytical conclusions made. Third is by having a structured analytical framework, thereby ensuring that the evaluation of ML and AI applications is done under uniform criteria.

This study may not involve primary data and experimentation, but it uses established empirical findings and examples from the real world, which gives a very good and credible basis for analysis. Applied technologies can best be understood through such an approach since contextual understanding and practical relevance are key.

Methodological limitations and future extensions

Limitations are acknowledged. Secondary data does not permit the capture of organization-specific challenges in

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implementation and related metrics on performance. Without quantitative experimentation, it, too, cannot measure directly the extent of performance gains enabled by ML- and AI-enabled process reengineering. However, these limitations are offset by a study that focuses on applied insight and cross-domain synthesis.

Future studies can build on this by adding empirical case studies, surveys or experiments on organizational datasets. This will help look more into the performance outcomes and further validate the patterns noticed.

Conceptual framework for machine learning and AI-enabled business process reengineering

To set in clear perspective the role of Machine Learning (ML) and Artificial Intelligence (AI) in Business Process Reengineering (BPR), a conceptual framework is proposed by this study, which describes, or rather explains, how intelligent technologies make a shift from traditional business processes to data-driven and adaptive systems in the digital age. The framework puts forward the logical flow from organizational data to intelligent processing and process redesign mechanisms, as well as business outcomes. It does not focus on technical details of implementation but rather on practical relationships applicable in real-world business environments.

The proposed framework is based on the perception that business process reengineering in the digital age has an increasing dependency on data and intelligent analysis. There are large volumes of data being generated by modern organisations through their enterprise systems, digital platforms, and customer interactions. When properly analysed using ML/AI techniques, these data become a supporting element for redesigning business processes in a more efficient, flexible, and informed way.

Input Layer: Business data and digital resources

The first part of the conceptual model contains business information and digital assets created from ordinary organizational activities. It covers transactional data, measures of how well operations perform, details about customer interactions, and records of process execution. These sources show the present condition of business processes and offer clues about current inefficiencies as well as delays or gaps in performance.

In the digital age, data is constantly created and refreshed, permitting companies to go past still process examination. Great and prompt information permits ML and AI frameworks to precisely display process conduct and distinguish chances for reengineering. This input layer forms the foundation upon which intelligent technologies operate.

Intelligent technologies layer: Machine learning and artificial intelligence

Homomorphic encryption allows the validation process to be carried out on encrypted information, and thus, user-sensitive data can be said to be safe throughout. The approach avoids a risk of deanonymization in the classic consensus mechanisms. Denote the encryption and the decryption functions by E () and D (), respectively. The homomorphic property may be stated as follows: Let E (·) denote the encryption function, and D (·) the decryption function. The homomorphic property can be defined as:

Decentralized Identity (DID) framework

It denotes the application of ML and AI techniques to business data. Machine learning models may be used for pattern recognition as well as future outcome predictions and anomaly detection related to business processes. For example, predictive models can be leveraged in the determination of demand fluctuation, bottleneck revelation, or operational risk assessment. The insight garnered here supports informed decision-making in process redesign.

Artificial intelligence supplements machine learning with intelligent automation and decision support. AI-based systems will not only perform mundane task automation but also provide prescriptive action recommendations and enable real-time decision-making within business processes. The two, ML and AI, work hand in hand to turn raw data into actionable intelligence that informs process reengineering initiatives.

Business outcomes layer

The last part of the conceptual framework is about results that come from using ML and AI in business process reengineering. Results can be better work efficiency, lower process costs, improved decision quality, more process flexibility, and a better customer experience. When organizations put intelligence into the design and running of processes, they get steady and long-lasting performance improvement.

It underscores that the effects of ML and AI are not confined to mere automation but stretch toward strategic gains like heightened responsiveness, resilience, and an edge in digital realms. These results show the hands-on worth of smart tech in aiding strong business process reengineering.

Framework summary

The proposed conceptual framework logically arranges how machine learning and artificial intelligence facilitate business process reengineering in the digital age. It captures the evolution of intelligence based on data, leading to the transformation of processes and measurable business results. By emphasizing applied relationships instead of technical complexity, this framework makes explicit the adoption of ML and AI from a business and organizational view.

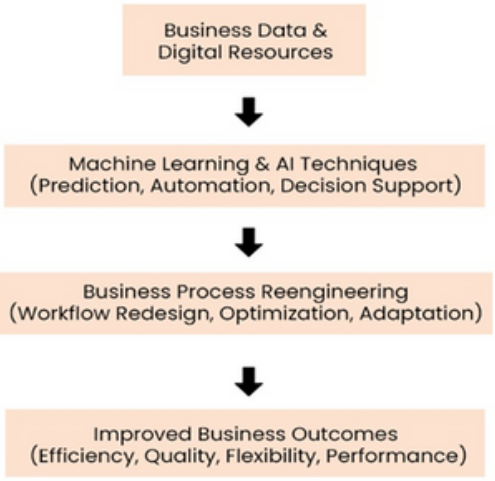

Figure 4. Conceptual theoretical model for ML and AI enabled business process reengineering.

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Results and Discussion

This part looks at how Machine Learning (ML) and Artificial Intelligence (AI) change Business Process Reengineering (BPR) in the digital age by mixing results from practical studies and noted business actions. The talk highlights process-level effects and organization meaning more than test numbers, fitting with use-focused machine learning research.

Process automation and efficiency improvement

Machine learning and Artificial Intelligence-enabled business process reengineering deliver increased process automation and enhanced operational efficiency as its most visible fruits. Firms are implementing systems whereby intelligence can be applied to automate many rule-based and repetitive tasks like customer queries, transactions, and document verifications. As noted by Davenport and Ronanki, in the current perspective, it is to be noted that firms implement intelligence primarily for the automation of routine activities related to the business, which executes faster, resulting in reduced operational costs [2].

For instance, AI chatbots auto-response to the regular inquiries, which significantly lowers the response time of the human agent as well as their workload. In terms of BPR, this sort of automation would remove all activities that are not value-adding and would also simplify process flows so that the organization can have a much leaner and more scalable operation [7].

Predictive analytics and proactive process redesign

ML models play a vital function in allowing predictive analytics in the newly engineered business process. Forecasting techniques based on ML enable firms to predict variations in demand as well as any bottlenecks that may occur in their processes and hazards related to their operations long before they become real issues. As noted by Wamba et al., data-supported prescriptive predictive analytics raises the degree of decision-making quality and support for proactive process redesign in operations environments [3].

In supply chain and operations management, for example, predictive demand models enable organizations to redesign inventory planning and procurement processes. Fluctuations in the demand that can be forecast reduce stock shortages as well as overstocking of inventories. This comes with improved process efficiency as well as better control of costs. Such predictive abilities transform business process management from a reactive practice to an upfront, highly proactive, data-driven design.

Intelligent decision support and human–AI collaboration

Another major result of ML and AI-enabled business process reengineering is improved decision support within the business workflows. Rather than fully replacing human decision-makers, it is common to see AI systems augmenting human judgment by providing recommendations, risk assessments, and insights into different aspects of performance. As indicated by Shrestha et al., contextual understanding and accountability are highly relevant in complex business processes; thus, human-AI collaboration would work best in such environments [4,8].

As an example, AI-based credit assessment systems come to help financial analysts by reviewing extended datasets and recognizing patterns related to risks while leaving final approval decisions entirely under the control of humans. This will not only speed up the decision but also ensure consistency between decisions made by different people while maintaining transparency, hence building trust. Embedding such intelligent decision support mechanisms in reengineered processes increases efficiency and improves the quality of decisions [9].

Continuous monitoring and process optimization

It further found that ML and AI facilitate the support of continuous process monitoring and optimization, which has never been a strength for traditional BPR initiatives. Conventional process redesign efforts are very static and periodic in nature. Performance data should be leveraged by ML-based monitoring systems to continuously identify anomalies, inefficiencies, and deviations-in real time [10].

AI-powered surveillance allows firms to change their workflows and resource allocation in response to changing conditions. For example, its fraud detection tools continuously learn from fresh transaction data, allowing the organization to constantly redesign its risk management process. This makes the process more resilient, hence reducing the exposure levels of firms on daily operations, particularly in highly digital environments where data drives most activities [11].

Organizational and strategic implications

Beyond the operational enhancement, ML and AI-enabled business process reengineering carry wider organizational and strategic impacts. The support of intelligent technologies fosters better alignment between process redesign initiatives and other strategic objectives, whether these be customer-centricity, agility, or innovation [12]. Attuned to market dynamics and customer expectations through insights based on data, organizations are enabled to redesign their processes.

Also, the literature speaks much of problems with data quality, integration of systems, and interpretability of models. ML predictions cannot be any more reliable than the quality of data used; further, a rather undocumented aspect is that managers may not fully trust decisions made by AI to drive operations if these are not transparent [2,13]. This means that adequate governance has to involve stakeholders and take care to align technology with business.

Discussion summary

This discussion clearly shows how much machine learning and artificial intelligence can contribute to the enhancement of business process reengineering through automation, predictive analytics, intelligent decision support, and continuous optimization. The few examples reviewed above, in tandem with earlier studies, go further to postulate that ML and AI assist not only in achieving strategic flexibility on top of operational efficiency in this digital age [3,4]. Applied systematically and cognizant of the environment, intelligent technologies would bring great value to the redesign of business processes toward sustaining organizational performance.

Conclusion and Future Research Directions

This paper analyses how Machine Learning (ML) and Artificial Intelligence (AI) have impacted Business Process Reengineering (BPR) since the advent of the digital era, discussing applied and real-world business contexts. It describes how ML and AI support Modern Business Process Transformation as enablers through Automation , Predictive Analytics, Intelligent Decision

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Making, and Continuous Process Optimization. It compares the traditional static analysis-based process reengineering approach with that based on intelligent technologies, which enable data-driven and adaptive redesign of processes to fit the dynamic nature of digital business environments.

Output accompanies input. Efficiency goes higher than the quality of decisions, and flexibility is added to processes when ML- and AI-enabled business process reengineering comes into play. Much time is saved on automation of routine and decision-intensive tasks, plus reduced human error in execution. Predictive analytics gives adequate lead time to adjust to any change in demand, analyze bottlenecks, and redesign workflows even before a problem sets in. This corroborates earlier studies that intelligently attest productivity boosts by practically embedding intelligence not reactively but proactively through moving management from post-factum towards predictive and proactive design process.

Another key conclusion of this study is the importance of human–AI collaboration in successful business process reengineering initiatives. Rather than replacing human expertise, ML and AI systems are most effective when they augment decision-making by providing insights, recommendations, and risk assessments. This collaborative approach enhances transparency, accountability, and trust in intelligent systems, particularly in complex business processes that involve strategic judgment. As a result, organizations can achieve better outcomes while maintaining human oversight and control.

Also noted is the role that ML and AI may play in further enabling the continuous monitoring and tuning of reengineered processes. In the new intelligent system, organizations will be able to monitor performance in real time for anomaly conditions and tune workflows as their conditions change. This will be especially valuable in digitally intensive environments where uncertainty not only exists but also changes rapidly. Prior research has proven that data-driven process monitoring and analytics substantially enhance organizational responsiveness as well as resilience. From a BPR perspective, this can be viewed as a shift from one-off process redesign to continuous and sustainable process improvement.

The study acknowledges several challenges about ML- and AI-enabled business process reengineering. Apart from the problem of data quality and system integration, model interpretability is another aspect that makes less effective the application of intelligent technologies. The organization must ensure that the data used in developing ML models is accurate, consistent, and reflective of real process behaviour. Approaches to AI that are transparent and explainable readily build managerial confidence to support adoption in decision-critical business processes. Apart from technical solutions, strong governance frameworks and organizational alignment are also required.

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