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The Role of Artificial Intelligence in Enhancing Business Process Management Systems and its Implications

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Abstract:

We will see in this paper how is developments of management from 18th century till end of 20th century leads to resulting the Business Process Management (BPM) expression. Then in the late 1980s how this term became the technical concept of business automation. Then how BPM systems has evolved to be a pivotal tool for enhancing automation for industries, business of companies and organizations workflow. Then we will look on how Artificial Intelligence has reshaped the landscape of efficiency and decision-making into Business Process Management. Finally, will get a result that rapid progression of Artificial Intelligence marks a transformative era in process management, fundamentally altering methodologies and potentials. And it's indisputable that AI will significantly redefine the future of BPM, accelerating and enhancing process optimization and transformation for companies.



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Keywords: Artificial Intelligence AI, Business Process Management Systems BPMS, Business Automation, Decision Making, Natural Language Processing NLP.

المخلص:

سنرى في هذه الورقة كيف أدت التطورات في الإدارة من القرن الثامن عشر حتى نهاية القرن العشرين إلى ظهور مصطلح إدارة عمليات الأعمال (BPM). ثم في أواخر الثمانينات كيف أصبح هذا المصطلح هو المفهوم التقني لأتمتة الأعمال. ثم كيف تطورت أنظمة BPM هذه لتصبح أداة محورية لتعزيز الأتمتة في الصناعات وأعمال الشركات والمؤسسات. ثم سننظر في كيفية إعادة تشكيل الذكاء الاصطناعي لمشهد الكفاءة وصنع القرار في إدارة عمليات الأعمال. وأخيرًا، سنحصل على نتيجة مفادها أن التقدم السريع في الذكاء الاصطناعي يمثل حقبة تحويلية في إدارة العمليات، مما يؤدي إلى تغيير المنهجيات والإمكانات بشكل أساسي. ولا جدال في أن الذكاء الاصطناعي سيعيد تعريف مستقبل BPM بشكل كبير، مما يؤدي إلى تسريع تطور العمليات، والتحول للشركات والمنظمات والمؤسسات.

الكلمات المفتاحية: الذكاء الاصطناعي AI، أنظمة إدارة العمليات التجارية BPMS، أتمتة الأعمال، اتخاذ القرار، معالجة اللغات الطبيعية البرمجة اللغوية العصبية.

Introduction:

Business Process Management System (BPMS) is a combination of technology tools used to analyze, model, optimize, and finally automate business processes. It can be low-code or no-code platforms, cloud-based functionality, and user-friendly features using workflow design automation. Using BPMS is a way of structuring business processes on technology based around outcomes needed to achieve for business and



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customers, and it focuses on building the system from the center out and then going in parallel to building a database, mobile application, website, chatbots, etc.

A common mistake in building technology projects is starting from establishing end user channels like building mobile applications, websites, chatbots, etc. One of the most negative of starting the project by establishing the end user's channels is the service provider will face impediments to changing requirements because every time a customer wants to make changes, the service provider's developer has to go and make changes in multiple places and it becomes more expensive and slower to respond to changing customer needs, that's not meet with best technology project building management approach and can avoid it by starting the establishing the project from the process flow chart and link it with channels that the customer wants to achieve it to allow his end users to use his automated project in their business easily and that is the value that BPMS tools provide.

To look at the utilization of business process management System from an AI viewpoint will offer a lot of assistance to providers and customers. The integration of AI into BPM leads to more efficient, data-driven, and adaptive processes, ultimately improving an organization's operations and competitive advantage.

While Artificial Intelligence is leading the last revolution of developing the world and it's kicked off basically from the programming domains to cover all the world's domains, while we are facing a lot of fears from advancing this field, we can get more benefits if we use it with the suitable way to improve our business and to get



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best results, highest efficiency for all stakeholders. Within today's fast-paced technological landscape, the intersection of Generative Artificial Intelligence (AI) and Business Process Management System (BPMS) has become a subject of considerable fascination and discussion.

The growing capabilities of Generative AI are opening a world of opportunities that are challenging established norms of generating business process automation systems. Here in this paper, we are talking about business process management systems that already made a revolution in the automation of the business and facilitated organizations and companies to specify and collect their big data extracted from each operation and availability to clustering and classification of these data.

While we have this huge data the AI algorithms and tools can put their fingerprint to achieve other aims for BPMS with decision-making and Predictive Analytics in business processes allowing employees to perform tasks more efficiently, reducing errors, and allowing for higher value contributions.



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Evolution of Business Process Management:

Business Process Management (BPM) refers to the discipline of managing, modeling, analyzing, and improving business processes within an organization [1].

The concept of Business Process Management (BPM) centers on organizing work within organizations by emphasizing processes. Initially rooted in self-sufficiency, early societies saw individuals managing their production, evolving into medieval guilds and specialized labor during the Industrial Revolution. Adam Smith's observations on pin-making highlighted the efficiency of dividing tasks which Frederick W. Taylor later emphasized in the scientific management principles that he proposed and known as scientific management. A key element in Taylor's approach is an extreme form of labor division and work analysis.

Adam Smith (1723–1790), Scottish economist and philosopher explains the process of pin-making as follows:

“One man draws out the wire, other straightens it, a third cuts it, a fourth points it, a fifth grinds it at the top for receiving the head; to make the head requires two or three distinct operations; to put it on is a peculiar business, to whiten the pins is another; it is even a trade by itself to put them into the paper; and the important business of making a pin is, in this manner, divided into about eighteen distinct operations, which, in some manufactories, are all performed by distinct hands, though in others the same man will sometimes perform two or three of them. I have seen a small manufactory of this kind where ten men only were employed, and where some of



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them consequently performed two or three distinct operations. [. . .] Those ten persons, therefore, could make among them upwards of forty- eight thousand pins in a day. Each person, therefore, making a tenth part of forty-eight thousand pins, might be considered as making four thousand eight hundred pins in a day. But if they had all wrought separately and independently, and without any of them having been educated to this peculiar business, they certainly could not each of them have made twenty, perhaps not one pin in a day; that is, certainly, not the two hundred and fortieth, perhaps not the four thousand eight hundredth part of what they are at present capable of performing, in consequence of a proper division and combination of their different operations.”[2].

From individual artisans to specialized factory workers, the historical shift led to extreme labor division, marking a transition from generalists to pure specialists in both industrial and administrative realms, shaping the core of BPM's focus on process optimization and specialization in work structures.

During the 1980s Ford's significant investment in Mazda, Ford executives visiting Mazda's facilities noted a striking disparity in staffing levels between comparable units at Ford and Mazda. Despite being noticeably understaffed, Mazda's units functioned efficiently, prompting a profound case study on Ford's purchasing process.

Ford's purchasing approach at the time involved a meticulous process where every purchase required approval through the purchasing department. Upon determining



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the need for a specific quantity of products, the purchasing department issued an order to the vendor and sent a copy to accounts payable. Upon delivery at Ford's warehouse, the goods came with a shipping notice, also sent to accounts payable, alongside a direct invoice from the vendor. This method meant accounts payable had to cross-reference three documents—purchase order copy, shipping notice, and invoice—each containing around 14 data items, leading to numerous discrepancies daily. Ford allocated hundreds of personnel to resolve these discrepancies, a stark contrast to Mazda, where only five employees managed this process despite Mazda not being significantly smaller than Ford in relevant aspects. The fundamental difference lay in Ford's reactive approach to detecting and addressing discrepancies versus Mazda's proactive method of avoiding them altogether. Ford, upon thorough analysis and comparison with Mazda, underwent several adjustments to its purchasing process to emulate Mazda's efficiency in avoiding discrepancies proactively and extracted new design for the process as follows:

Initially, Ford implemented a centralized database to consolidate purchase information, replacing the traditional paper-based system. This database became the hub for the purchasing department to store and manage all purchase orders. Additionally, new computers were installed in the warehouse, providing direct access to this database. Upon the goods' arrival, warehouse staff could immediately verify if the delivery aligned with the initial purchase, rejecting any discrepancies. This shift placed responsibility on vendors to ensure precise deliveries. When goods



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matched the recorded purchase, acceptance was logged. As a result, the accounts payable team only had to process payments as per the original purchase order. This transformation enabled Ford to reduce its accounts payable workforce significantly, downsizing from around 500 employees to just 120—a remarkable 76% decrease. Based on previous cases and other persuasive cases new concept has appeared called Business Process Reengineering (BPR) famously narrated by Michael Hammer and later explored by various analysts [3]. Hammer, as well as others, defined BPR as a radical rethinking and redesigning of business processes to achieve substantial enhancements in key performance metrics like cost, quality, service, and speed. Then numerous white papers, articles, and books appeared on the topic throughout the 1990s, and companies throughout the world assembled BPR teams to review and redesign their processes.

By the late 1990s, the enthusiasm for BPR faded away, and many companies terminated their BPR projects and stopped supporting further BPR initiatives because of several different reasons.

In 1999 an empirical investigation done by Kevin McCormack on 100 US manufacturing firms, found that organizations emphasizing processes exhibited superior overall performance, fostered a stronger sense of coworking between employees, and encountered fewer clashes between different departments [4]. In the meantime, different types of management IT systems emerged, like Enterprise Resource Planning (ERP) systems, Workflow Management Systems (WFMSs),



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Customer Relationship Management (CRM) systems, and Document Management Systems (DMSs). that led to the revitalization of certain concepts from Business Process Reengineering (BPR) and set the groundwork for the rise of concept Business Process Management (BPM) with his technological tools like ServiceNow, SAP, Bizagi, Jira, Nintex, Pegasystems and Appian and a lot of other platforms that sometimes referred to as Business Process Management Systems (BPMS).

Business Process Management System (BPMS) is a technical discipline defined as a software suite designed to model, automate, execute, and monitor business processes within an organization. allows users to streamline workflows based on business needs by establishing virtual representations of workflows that convert the work to an automated system which provides real-time visibility into ongoing processes for analysis and improvement.

Most BPMS are low-code development tools that we describe as Products and/or cloud services for application development that employ visual, declarative technique instead of programmatical technique. these low-code development tools create the code for the user. User interface features such as drag-and-drop, process flows, and visual tools allow anyone to create transformational software regardless of technical ability [5].

Impact Of Artificial Intelligence on Business Process Management Systems:



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Artificial Intelligence (AI) tools, in a broader sense, signify a revolutionary leap in how we interact with technology and data. These tools represent a convergence of advanced algorithms and computational power that enables machines to learn, reason, and perform tasks that traditionally require human intelligence. These tools are pervasive in modern life, influencing everything from the recommendations we receive on streaming platforms to the way industries optimize their operations. AI tools hold the promise of efficiency, innovation, and problem-solving across diverse domains, offering insights, automating tasks, and enhancing experiences. However, they also raise important questions about ethics, privacy, and the future of work, challenging us to navigate their impact on society and human-machine interactions. Overall, AI tools mark a pivotal moment in our technological evolution, shaping the way we live, work, and interact with the world around us.

Scientifically, these tools represent a paradigm shift in how we process information and understand complex systems. AI tools leverage advanced algorithms and machine learning techniques to analyze vast datasets, revealing intricate patterns and correlations beyond human capacity. This scientific prowess has propelled breakthroughs in fields like healthcare, astronomy, and materials science, accelerating research and enabling discoveries that were previously unattainable.

From a societal standpoint, Artificial intelligence will definitely cause our workforce to evolve. While the alarmist headlines emphasize the loss of jobs to machines, but



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the real challenge is for humans to find their passion with new responsibilities that require their uniquely human abilities. According to expectation and result of many research papers and articles millions of existing jobs will be replaced by AI around the world during next decade [12], but also other millions of jobs could be created, and ability to catch it will depend on how we can challenge on creating AI tools or just using it as end-users. The transformative impact of artificial intelligence on our society will have far-reaching economic, legal, political, and regulatory implications that we need to be more discussing and preparing for.

Our paper revolves around the impact of Artificial Intelligence on Business Process Management Systems (BPMS), so It's necessary to highlight these tools from a BPMS perspective. AI tools represent a transformative advancement, revolutionizing how organizations that use BPMS streamline operations and make decisions. By integrating AI capabilities into BPMS like PEGA, ServiceNow, Bizagi, Nintex, and others, businesses can automate complex tasks, optimize workflows, and gain deeper insights from their processes. AI augments BPMS by enhancing data analysis, enabling predictive modeling, and facilitating real-time decision-making. These tools drive efficiency by automating repetitive tasks and adapting processes dynamically based on changing conditions. Furthermore, AI-powered BPMS enhances customer experiences through personalization and quicker issue resolutions, while also paving the way for continuous improvement through data-driven optimizations. Overall, the incorporation of AI within BPMS amplifies



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their effectiveness, enabling organizations to achieve higher levels of efficiency, agility, and innovation.

The AI's impact is not to facilitate work only for end users but also is facilitate the work of BPMS architects and developers as we can see in the next achievements of BPMS.

Intelligent PDF Forms Converter is a groundbreaking feature within the "Nintex" platform that stands out as a prime example of AI innovation. This remarkable tool utilizes computer-vision AI technology to meticulously analyze and transform various PDF files, including scanned or image-based ones, into dynamic Nintex Forms. Throughout the conversion process, developers can engage with the PDF, enhancing accuracy and ensuring fidelity to the original document. Once the conversion is completed, the resulting Nintex Form becomes fully editable, providing an agile and customizable solution [7]. For form designers dealing with collections of paper-based or existing PDF forms, this feature becomes a time-saving asset, simplifying and accelerating the digitization process significantly, also who is known, may we could see it in the next versions to convert the business design directly from text to automation system.

Across diverse platforms, numerous impactful achievements deserve our attention, among them, NowAssist by ServiceNow stands out prominently. This AI service, an integral facet of the ServiceNow platform, embodies an advanced approach to artificial intelligence and machine learning. Its core mission revolves around



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empowering intelligent experiences, automation, and optimization within various business contexts. Delving deeper, NowAssist unveils an array of tools strategically designed to elevate the influence of Artificial Intelligence within the realm of business process management systems, further augmenting their efficiency and effectiveness like its approach for Field Service Management (FSM), Admin Console, Creator, Customer Service Management (CSM), IT Service Management (ITSM) and HR Service Delivery (HRSD) [6]. Let's talk about NowAssist for Creator, NowAssist for Creator comprises essential tools designed to enhance various aspects of the development process within the platform:

1. NowAssist for code generation: This tool significantly expedites script writing for developers by leveraging AI-generated code suggestions. When developers prompt the system with specific queries, it responds by providing suggestions, empowering them to write scripts more rapidly and efficiently. This feature harnesses the power of the Now LLM for code framework, ensuring accuracy and relevance in the suggestions offered.
2. NowAssist Recommendations for Flow Designer applications: This component focuses on optimizing the flow authoring experience. It employs AI-generated content to provide flow authors with a curated list of recommendations for their workflow's next steps. By leveraging AI, this tool assists users in making decisions and streamlining the workflow creation process.



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3. NowAssist in Flow Designer: This tool is designed to simplify the creation of multi-step workflows using natural language. By allowing users to interact with the system using familiar language patterns, it removes complexity from the process of building intricate workflows. This intuitive interface enables users to swiftly create complex workflows, enhancing efficiency and reducing the learning curve associated with intricate workflow design.

Overall, these components within NowAssist for Creator collectively aim to streamline and optimize various aspects of development, offering developers and flow authors enhanced tools and capabilities to expedite their tasks, improve accuracy, and ultimately bolster productivity within the platform.

We have also within another platform the assistant Ada which is AI components in the Bizagi platform. Ada represents a pivotal AI-driven component integrated within the Bizagi platform, functioning as a catalyst for optimizing business efficiency. Its advanced conversational analytics redefine user interactions, empowering users to effortlessly extract insights without recurring IT or Operations queries. Operating seamlessly within Bizagi Apps, Ada facilitates streamlined data retrieval through natural language, enabling swift access to relevant information for business users. Ada's adaptability extends further by tailoring recommended actions based on individual user profiles and contextual nuances, fostering enhanced productivity. Moreover, Ada's provision of readily available analytics expedites data



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comprehension, ensuring prompt understanding and presentation of critical insights. As a core asset within Bizagi, Ada significantly streamlines processes, fortifies decision-making capabilities, and bolsters overall productivity across the organization.

The AI methodologies showcased in BPMS platforms are integral components within their expansive capabilities. While our discussion highlighted specific AI approaches, it's crucial to recognize that these are just a fraction of the comprehensive functionalities available. Numerous exceptional BPMS AI tools, including Pegasystems, Appian, Tibco, Trisotech, Ultimu, Newgen, Kissflow, IGrafX, Aurea Savvion, and others, significantly contribute to this landscape. However, due to their vastness and intricacies, it's not feasible to delve into the specifics of each, highlighting the depth and richness of AI integration across diverse BPMS platforms.



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Conclusion:

In the contemporary landscape, the competitive drive among entities to deliver cutting-edge artificial intelligence tools manifests as a testament to the rapid evolution within the field. This era emphasizes the acceleration of AI innovation, specifically within Business Process Management Systems (BPMS). Recognizing the transformative influence of artificial intelligence on BPMS becomes imperative. This exploration highlights AI's pivotal role, in facilitating a paradigm shift by infusing operations with predictive analytics, automation, and astute decision-making capabilities. Integration of AI-driven technologies within BPMS yields tangible benefits: refined workflows, heightened data analysis, and expedited, more discerning decision-making processes. Notably, AI serves as an augmentation to human capabilities, fostering a synergistic interplay between technology and human proficiency. As AI continues its evolution, its potential to fuel innovation, enhance operational efficacy, and unlock unprecedented efficiencies within BPMS remains unparalleled. This collaborative synergy between AI and BPMS aims not solely to refine existing processes, but also to steer groundbreaking advancements in business functionality and adaptability amid the dynamic evolution of modern enterprises.



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