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AI – powered Business Services in the Hyperautomation Era

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Abstract. *Hyperautomation is a business-driven approach, conceptualized in 2019 by Gartner Inc., that combines various technologies such as Artificial Intelligence (AI), Robotic Process Automation (RPA) and integrated platforms as a service (iPaas) with the aim of making business processes more efficient by substituting human intervention. Among these, implementations of AI within business services use technologies like Natural Language Processing, Voice and Image Recognition, Virtual Agents, Machine Learning or Deep Learning platforms. Acknowledging this reality, we are interested in developing answers to the following research questions: (1) What are the main categories of business services which integrate specific AI tools? (2) What are the transformed business processes and their operations provided by AI tools? (3) What are the benefits related to AI integrated tools? For this triadic purpose, a systematic literature review on the implementation of Artificial Intelligence in the field of business services was carried out. Only works indexed in the Web of Science database, published in the last 5 years, were selected. Moreover, the websites of the main developers and client companies were investigated. Our findings include a selection of identified AI solutions, structured by main business services categories; we have also outlined the performed tasks and the resulting benefits of each listed AI tool. The synopsis of AI-powered tools presented in the paper could serve professionals, managers and researchers in designing future policies, operational procedures and research approaches to cope with new challenges of disruptive technologies from the AI spectrum.*

Keywords: artificial intelligence, business services, hyperautomation

Introduction

Hyperautomation, a relatively new concept in technology, refers to the knowledge work automation across a wide range of business functions and technologies coupled with a responsive workforce, typically integrating Artificial Intelligence (AI) algorithms and Robotic Process Automation (RPA) features (Lasso-Rodriguez and Winkler, 2020). The best strategy for thriving and gaining a competitive advantage is to adopt new technologies (Elrefai et al., 2021). The business services environment has already seized the opportunities offered by artificial intelligence (AI) technologies in terms of increasing competitiveness, reengineering services or rethinking business strategies (Sestino and De Mauro, 2021). The relatively recent adoption of AI technologies in the business services industry had an amplifying effect on labor productivity, estimated at over 40%. The AI global market is predicted to reach USD 407 billion by 2027 (MarketsandMarkets, 2022). For business services, the major drivers fostering AI integration include decision support automation,

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real-time recommendation engines, growth of data-based AI, advances in Deep Learning technologies, and the increasing number of cybersecurity incidents and ransomware attacks across the globe.

The research objective is threefold, defined by the following research questions: *1) What are the main categories of business services which integrate specific AI tools? (2) What are the transformed business processes and their operations provided by AI tools? (3) What are the benefits related to AI integrated tools?*

As a general term, *business services* refer to actions and tasks that provide support for maintaining a business, which do not deliver any standard tangible commodity. Business services are timely characterized by a high level of complexity involving routine activities and tasks that are stressful and inefficient for humans to perform. The major attributes of business services are (Vedantu, 2023): intangibility (the customer often has to pay for a service before its quality has been determined); inconsistency (customers have different requests and expectations); inseparability (the production and the consumption of the services seem to be inseparable); inventory (a business service must be delivered when demanded, but it cannot be stocked) and customer involvement (a customer has the opportunity to modify the services according to specific requirements). The main identified areas of business services are marketing, finance and accounting (FA), human resources (HR), banking, customer support (CS), software, consultancy, training, logistics and transportation, security and waste management services. After reviewing the specialized literature, we decided to focus on AI-integration into marketing services and the next three categories (also assimilating training services in the HR area), based on the number of AI integration examples found, but also for the appropriate study sizing.

In the present digital era, AI is considered a catalyst for business process transformation, enabling organizations to have real-time analysis, learn more about their customers and forecast future steps (Nosova et al, 2022). Therefore, AI is expanding outside engineering, information technology, and data analytics, gradually becoming a crucial ally of marketing (Liu et al., 2023; Mehta et al., 2022; Ameen et al., 2022; Gao & Liu, 2022; Huang & Rust, 2020), finance and accounting (Mihai & Dutescu, 2022; Shi, 2020), banking (Doumpos et al., 2023; Elrefai et al., 2021) and human resources (Bhat et al., 2022; Charlwood & Guenole, 2022).

However, there is a gap in the specialized literature concerning the adoption of AI technologies in business services, or the inventory of existing AI tools already implemented. As a consequence, the purpose of our study is to explore the interest of organizations in integrating emerging AI technologies; we also analyze how companies have refined their process maps by incorporating AI into current business services.

Within this study, the results include: outlining a theoretical framework for describing AI based on the specialized literature review, identifying the AI applications working among the current business environment, establishing the types of processes that incorporate the revealed AI tools and presenting the benefits acquired by organizations that integrate AI into their processes. Furthermore, a synoptic table was developed, structured to illustrate the business service, the transformed business process, the AI-performed operations, the benefits resulting from its implementation, producers and customers, and the documentation source. This table was then broken down by the main categories of AI-enriched business services discovered in the literature.

Further, the article has three main sections. The first part focuses on capturing, from the literature, an articulated tableau of the concepts of "Hyperautomation", "business services" and specific AI tools. The next section describes the research methodology, and the third part is

dedicated to presenting our work's results and discussions. Conclusions, limitations and future research directions are presented at the end.

Literature review

Even though the term "hyperautomation" has been used in research for the past 20 years, a common context and meaning started recently to be gradually accepted (Lasso-Rodriguez and Winkler, 2020).

In order to cope with the increased pace of customer expectations, organizations rely on integrating technology into business processes (Wisniewski, 2020). By definition, AI refers to computer systems that simulate human cognitive processes (Stamova and Draganov, 2020), with the intention of anticipating, automating, and improving tasks that were before performed only by individuals, including voice and facial recognition, decision-making and translation (IBM, 2020).

Reviewing the bibliographic references, including both academic works and official statements from businesses creating and leveraging AI solutions, it was noticed that AI has started to be incorporated into business processes since the 2000s and is currently attempting to transform them (Wamba-Taguimdje et al., 2020). AI has raised standards in terms of productivity, usefulness and accuracy of work tasks within organizations. According to Bernard Marr, Alibaba, one of China's top firms, intends to invest $1 trillion in the AI sector by 2030 (Kumar & Kalse, 2021). Giants like Facebook, Microsoft, Amazon, and Google are rushing to integrate AI into all of their goods and services; businesses of all sizes can benefit from a variety of tools that enable them to create their AI-based products (Haefner et al., 2021). This expansion is due to increased algorithm complexity, rising data volumes and improved data collection methods (Kaul et al., 2020). According to recent studies, mathematical equations can be used to define the behavior of future AI systems before they are developed and to specifically describe potential negative effects, so that they might be avoided (Jebari & Lundborg, 2020). An AI algorithm can accurately forecast a company's revenue by averaging patterns found in previous sales data (Dwivedi et al., 2019).

It can be claimed that AI has begun to transform the majority of business processes, such as marketing, financial and accounting, banking, human resources, etc. By using advanced algorithms that run on massive amounts of data, AI solutions already available on the market successfully underpin management decision-making, forecast consumer behavior and identify market trends (Zahrani & Adel, 2018). AI applications are actually regarded as enablers, not as threats to the human workforce. Predictive analytics are produced by AI, which analyzes massive amounts of data considerably more quickly than the human brain, being used to enhance decision-making processes (Brynjolfsson & McAfee, 2017). Unlike RPA tools, AI self-improves based on its own patterns, analyzes unstructured data and natural language, adapts to changes in the environment and replaces human cognition, not simply physical labor (Emmert-Streib et al., 2020).

One of the business services areas with a considerable volume of AI implementations reported in the literature is marketing. Organizations integrate AI solutions, such as chatbots, customer identification and content recommendation systems in various marketing activities: increasing social media user engagement, providing personalized online customer experience and enhancing the frequency of buying suggested goods and services (Nazir et al., 2023).

The fact that AI can significantly change the way specific marketing processes are carried out is no longer a novelty. According to Verma et al. (2021), AI can support marketers in establishing marketing strategy, in planning activities, being also useful in customer segmentation, audience targeting and product positioning. Another use of AI-powered analytical tools is related to product management, namely the assessment of the product design adequacy to consumer

requirements (Dekimpe, 2020). Text mining and ML algorithms can be applied in marketing to identify profitable customer segments (Dekimpe, 2020; Pitt et al., 2020; Zaki and McColl-Kennedy, 2020). AI can also support price management, knowing that pricing strategies must consider frequent real-time price variations caused by fluctuating demand. Slivkins (2019) suggests multi-armed bandits algorithms that make decisions over time under uncertainty. Bauer and Jannach (2018) revealed that Bayesian inference in ML algorithms can quickly adjust the price points to match the competitor's price. AI has notable contributions in place management, product accessibility being an important component of the marketing mix to increase customer satisfaction (Huang & Rust, 2020).

Over the years, AI solutions have become a key component of the financial and accounting (FA) services sector, particularly in automating processes (Ahmed et al., 2022). Full automation of many time-consuming operations is now possible thanks to AI, including evaluating financial transactions and gathering supporting data for corroborative proof during an internal audit. Moreover, AI tools are able to identify any anomalous amounts recorded in transactions; smart bots can perform account checks and reconciliations while ensuring that only authorized users have access to the data and that all actions are recorded in an audit trail (Kommunuri, 2022).

With the widespread use of chatbots in business services, banks may reduce labor expenses, transaction costs, improve customer satisfaction and boost efficiency. In some external circumstances, like the present COVID-19 pandemic epidemic and beyond, which limit face-to-face conversations, chatbots play an essential role in offering personal and online services (Nguyen et al., 2021). In addition, Sadok et al. (2022) propose AI-based rating algorithms for forecasting credit default risk in order to grant loans.

According to Kim et al. (2021), AI can be considered a new data processing technique for HR; as a result, more businesses are implementing HR analytics solutions that are powered by AI. AI tools can be included in various processes, such as talent acquisition, staff turnover, training, performance analysis and professional development (Palos-Sanchez et al., 2022).

Because AI has the ability to eliminate subjectivity and instead use the knowledge obtained from employee data mining to steer more objective decisions, it is useful in HR decision-making. While organizational research assists in examining aspects that are relevant to the organization and an evidence-based culture promotes decision-making based on analytics and data, employee monitoring tools can help identify issues, share insights, guide decisions and motivate stakeholders to act (Chowdhury et al., 2023).

Methodology

To carry out the literature review, we used Rowley and Slack's (2004) methodology quoted by Verma et al. (2021), an approach containing a five-stage process: selection of the database, search strategy (defining keywords), refining the initial results (establishing the inclusion and exclusion criteria), data plan analysis and identification of research gaps. The authors explored Web of Science (WoS), one of the most reputed databases, in order to extract the relevant literature for the last 5 years. This choice was based on its wide coverage, the advanced search filters and data analysis grids, all these elements ensuring better accuracy in data management. The keywords included in the initial search were "artificial intelligence" and "business services", generating 235 papers. Owing to limitations on availability, the final database consisted of 153 papers. Due to the fact that the identified publications did not provide clear examples of how AI may be applied to business processes, other additional terms ("marketing", "finance and accounting", "human resources") - types of business services - were included in searching with the boolean operators in

order to restrict the areas of interest to the major categories and to obtain the universal set of papers; thus, 50 additional articles were examined in order to fulfill the research objective.

The results obtained in the initial search were refined by applying the inclusion and exclusion criteria, this delimitation being extremely useful in identifying the most relevant sources for the literature review. The systematic literature review was carried out with the help of the tools provided by the Web of Science database: Web of Science Citation Reports, total citations and citations index. In order to attain the research objectives, only articles published in WoS-rated journals and papers presented at prestigious conferences were retained and a number of 17 websites detailing experiences in AI use were analyzed.

Results and discussions

The methodological approach of our research continued with the design of a data structure, to capture from the literature, in a synoptic table, the business service, the transformed business process, the operations performed by the AI tool, the benefits resulting from its implementation, producers and customers as well as the documentation source. This table was then divided into main categories of AI-powered business services discovered and chosen from the literature.

A selection of examples, found in the literature, on AI tools integrated into business services is presented below.

Artificial Intelligence in marketing

While AI-driven tools have the potential to increase performance, they are simultaneously changing customer relationships and altering marketing practices such as pricing strategy among business services providers (Bezuidenhout et al., 2023).

We also observed AI-generated improvements in harnessing customer data and thus increasing revenues or strengthening the company's position in the market.

Table 1. Illustrative selection of AI tools in marketing business services

Business service / Process	AI tool	Performed operations	Benefits	Technology / Developer / Clients	Source
Marketing / Customer Relationship Management	A customized retention solution	-exploits a customer's lifecycle and sequential absence and presence behavior data; -identifies the potential churn but discount-sensitive customers, thus determining when to provide discounts;	-an increased degree of customers' retention in 4S shops (**s**ales, **s**pare parts, **s**ervices and **s**urveys) ; -significant profit increase; -a modified recurrent neural network (RNN-2L) more efficient and reasonable in structure compared with traditional RNN;	RNN-2L; NLP; CV / URT / 4S shops - Automobile Business - repair and maintenance	Wang et al., 2020

Business service / Process	AI tool	Performed operations	Benefits	Technology / Developer / Clients	Source
Marketing / Feedback interpretation	AI tool for feedback interpretation	-analyzes customer feedback; -identifies the key labels related to the quantitative variables from the feedback; -transforms them into dichotomous variables; -runs analysis;	-managers can establish effective strategies by identifying the strengths and weaknesses of their services; -improvement of the market position;	AI, ML /R&D /Airline company	Ahmed & Diaz, 2022
Marketing / Feedback interpretation	Text Mining algorithm	-converts customers' review data (text data into numerical data);	-quantifies the degree of similarity between customers' responses, experiences and expectations regarding the global fintech firms' services and trends;	AI /R&D / Fintech firms	Oh, et al.,, 2023
Marketing / Customer loyalty and attraction	AI tool for tourists 'estimation	-predicts the number of local and foreign tourists; -determines the top tourism destinations based on the types of visitors;	-increases sales based on customized packages for each category of traveler; -promotes tourist destinations on social media based on the generated analysis;	ML /R&D / Hospitality organization	Abdurahman et al, 2022
Marketing / Attracting new customers	Smart media/AI TV	-keeps current subscribers while converting ad-supported users into new paying ones;	-positively affects a person's behavior and purchase intention; -generates more clients;	AI /R&D /several organizations	Deviatkin et al., 2022
Marketing / Attracting new tourists	AI and VR tool for tourists 'attraction	-a number of tourist cities expanded their selection by offering virtual and 3D experiences;	-attracts tourists from all over the world;	AI, VR / R&D / different cities	D'Amico et al., 2021
Marketing / Predictive demographic analyses	Demografy	-generates predictive statistics on customer demographics based on client names.	-aids the organization in better understanding its clientele;	AI, ML / Demografy / several organizations	Demography, 2021

Source: Authors' own research.

Legend: AI - Artificial Intelligence algorithm; ML - Machine Learning algorithm; DL - Deep Learning; GA - Genetic Algorithm; CV - Computer Vision; NLP - Natural Language Processing algorithm; RNN - Recurrent Neural Network; VR - Virtual Reality; R&D - Company Research & Development Department; URT - University Research Team.

Artificial Intelligence in finance and accounting services

AI-powered tools integrated into FA services have generated gains in tax calculation accuracy, monthly closing speed, cash flow quality or decreased processing time, workload, financial risk and unpaid invoice volume.

As the use of AI tools matures, leading specialized companies are gradually including them in activities such as auditing and FA consulting (Seethamraju & Hecimovic, 2022).

Table 2. Illustrative selection of AI tools in finance and accounting services

Business service / Process	AI tool	Performed operations	Benefits	Technology / Developer / Clients	Source
Finance Accounting / Taxes, methods of measurement for investment risk	Accern	-extracts and analyzes unstructured data; -automatically classifies them; -creates predictive and recommendation models, especially for investment risk analysis ; -calculates taxes;	-more accurate tax calculations (greater than 96%); -easy to use the platform, being intuitive; -no programming skills are required;	AI, ML, NLP / Accern Corporation / Allianz, Next Alpha, William Blair, Moody's	Accern Corporation, 2021
Finance Accounting / Payments	Tipalti	-provides the option to build integrated advanced payments into the process based on the history of all bills and payments; -pays suppliers using 6 different methods (checks, PayPal, bank transfers etc.)	-workload reduced by 80%; -eliminated financial risks; -accelerated monthly closing by 25%; -easy integration into RPA applications;	AI / Tipalti / Seeking Alpha, Oracle, Microsoft	Tipalti, 2021
Finance Accounting / Debt collection	Candis	-easily imports invoices from email or retrieves them from another present system; -gathers permissions from the platform's divisions after analyzing the data related to invoices; -automatically updates audit files with all documents;	-no required installation; -intuitive design for ease of use; -safe data storage; -ten years of document storage; -processing time reduced by 80%;	AI, ML / Candis GmbH / over 10.000 clients	Candis, 2021
Finance Accounting / Debt collection	Upflow	-automatic reconciliations; -notifies clients of payments through email and includes all important information (amount, charges, invoice numbers); -creates account balance analyses for each client;	-unpaid bills reduced by 20%; -improved cash flow; -connects to the company's invoicing system with a single click;	AI / Upflow Inc. / Veraset, Solar Screen, Gymlib	Upflow, 2023

Source: Authors' own research.

Artificial Intelligence in banking services

We found different types of AI-based tools integrated into banking services.

Sheth et al. (2022) present their benefits for employees and customers. Thus, AI-friendly interfaces reduce transaction times, prevent unnecessary queues at banks and reduce the frequency of bank visits. Digital piracy, which has thrived during the pandemic, can be more easily detected with AI-enabled banking services. They also highlight the critical role of managers in driving the adoption of AI-centric banking tools.

Our selection of examples could give decision-makers a concise picture of AI-based advantages, as well as ideas about critical points in their business processes where an AI implementation could be developed.

Table 3. Illustrative selection of AI tools in banking services

Business service / Process	AI tool	Performed operations	Benefits	Technology / Developer / Clients	Source
Banking (SSC) / Online fraud prevention	Frida	-identifies attempts at online payment fraud using automatic data evaluation and risk assessment; -performs real-time analyses, to avoid rather than identify fraud;	-offers real-time results; -safeguards annual revenues of over 55 billion euros;	AI, ML, DL / Risk Ident GMBH / Otto Bank	RiskIdent, 2021
Banking (SSC) / Bank management	Corniche	-categorizes and stores documents; -digital currencies for exchange rates are automatically retrieved; -encrypts messages to protect sensitive information;	-updates at least six times annually to ensure ongoing improvement; -stops information from leaking;	AI, ML, DL, / Megasol Technologies / Svea Bank, Global Fidelity Bank Ltd, Vantu Bank	Megasol Technologies, 2021
Banking (SSC) / Granting loans	Datrics	-analyzes information about earnings, credit history, transactions (including utility payments), employment history and Google Analytics data; -computes the credit score using ML algorithms;	-a 70% reduction in the time needed for a credit validation analysis; -provides a report with justifications for each category of evaluated data, if the file is rejected;	AI, ML / DATRICS INC. /several organizations	Datrics, 2021
Banking/ Customer support	Eva Chatbot	-understands user queries and delivers the extracted information from thousands of possible sources, in a matter of milliseconds; -provides access to the Bank's product details, fees for various products, application processes, branch IFSC Codes;	-5 million answers with over 85% accuracy; -over 20,000 daily conversations with customers across the globe; -offers a more personalized, voice-based conversational experience;	AI, NPL ML / HDFC Bank / 530000 unique users	Kevit.io, 2023

Business service / Process	AI tool	Performed operations	Benefits	Technology / Developer / Clients	Source
Banking/ Customer support	Erica Chatbot	-alerts customers if their monthly spending habits will bring their balance to zero up to seven days in advance; -flags recurring payments when they are higher than expected.	- 90% efficiency rating; - 1 billion interactions, averaging 1,5 million interactions per day since launching in 2018;	AI,NPL,ML / Bank of America / 32 million users	Bank of America, 2022

Source: Authors' own research.

Legend: SSC – Shared Services Center

Artificial Intelligence in human resources

According to Kim et al. (2021), AI can be considered a new data processing technique for HR; as a result, more businesses are implementing AI-powered HR analytics solutions. For instance, IBM stated it saved more than $100 million in costs in just one year by integrating AI into its HR business services (Charlwood and Guenole, 2022).

Palos-Sánchez, et al. (2022) claimed that AI applied to HR is an emerging field of study with perpetual development and a progressive future vision; they also highlighted that, despite other sub-areas having a significant potential for implementation, recruitment and selection processes represent the most of the actual applicability. Employees and stakeholders must be fully involved in the design and implementation of AI systems as part of an ethical approach toward AI in HR (Islam et al., 2022).

Table 4. Illustrative selection of AI tools in human resources services

Business service / Process	AI tool	Performed Operations	Benefits	Technology / Developer / Clients	Source
Human Resources /Recruitment	Recruitment AI tool	-automatically evaluates applications, based on criteria (university attended, work and industry experience); -finds qualified employees that can handle strategic issues and adjust to changes;	-faster employment openings are filled; -reduced time and effort;	AI / R&D / Unilever, L'Oréal, SAT Telecom	Islam et al., 2022

Human Resources /Recruitment	Recruitee	-creates campaigns for employment marketing on specific websites; -reviews everyone's calendars before scheduling a meeting; -in order to prevent losing top talent, it conducts an analysis of the most qualified individuals who were turned down, examines their resumes and redirects them to other employment offers; -creates dashboards to track the recruitment process and to identify areas for improvement;	-processing time reduced by 64%; -income growth is 4 times greater in percentage terms; -$240k/year saved in operational costs; -intuitive design for use;	AI, ML, DL / Recruitee / Accenture, TNT, RedBull	Recruitee, 2021
Human Resources / Training – Improving foreign languages	Duolingo	-interactive courses that hold learners' attention; -offers standardized testing to businesses looking for staff with a particular level of language proficiency; -the lessons adjust on their own, based on the user's chosen learning method;	-motivates users by offering the chance to earn virtual currency; -effectiveness: a semester's worth of foreign language classes at a university can be learned in 34 hours of Duolingo use; -24/7 accessible on both Android and IOS;	AI, ML / Duolingo / Not specified	Duolingo, 2021

Source: Authors' own research.

Conclusion

AI-based tools for business services are having a major impact on jobs; consequently, ensuring good conditions for employees to "move" into this new work environment is undoubtedly of interest as a future research direction for both scholars and managers of companies providing business services. Researchers warn also of the tendency to over-encourage the automation of processes, without considering the professional growth of human employees through the AI integration in business processes (Brynjolfsson, 2022) or the need to cultivate a mutually beneficial company-client-employee relationship (Pelau et al., 2021). From a labor market perspective, Tyson and Zysman (2022) highlight three categories of AI-focused policy interventions: 1) lifelong education, training and active labor market policies, aiming at helping people to develop skills necessary for a smooth transition to an AI-infused work environment; 2) policies specific to the platform business, regarding employees' social benefits and legal protection; 3) income support policies, addressing the after-tax incomes' increasing of workers who remain in low-wage jobs.

After reviewing this panoply of AI tools and environment, we consider AI technologies policies, the maturing trends and their effects on business services (Seethamraju & Hecimovic, 2022; Anica-Popa et al., 2021) to be a timely research direction for scholars and practitioners.

Capitalizing on this investigative background, it can be concluded that the adoption of AI has irrefragable benefits, but there are still thresholds to be surmounted, such as development, installation and maintenance expenses, the inability of AI to make decisions using emotion and

creativity, the large amount of data needed to learn from, to analyze or improve the decision-making processes and potential negative consequences regarding ethics and legal aspects.

We limited the research to the four categories of business services based on the number of AI integration examples found, but also for the appropriate study sizing. The research can therefore be extended to business service categories such as: transport and logistics, software, consulting, security or waste management, to AI drawbacks, integration risks and mitigation policies and similarly to other hyper-automation milestones.

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