IJRAR.ORG E-ISSN: 2348-1269, P-ISSN: 2349-5138

INTERNATIONAL JOURNAL OF RESEARCH AND ANALYTICAL REVIEWS (IJRAR) | IJRAR.ORG

An International Open Access, Peer-reviewed, Refereed Journal

Artificial Intelligence in Business Management

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Abstract : The challenge of incorporating Artificial Intelligence (AI) into enterprises persists despite growing interest. According to recent analyses, up to 85% of AI programmes eventually fall short of their goals. There are still few studies on successful AI applications, which might provide businesses just starting their AI journeys useful insights. In order to provide value to corporate management, this research tries to understand the proper business management of AI technology, people, and processes. This article goes into further detail about the resource orchestration strategy and examines how effectively AI is being used in Taobao's e-commerce fulfilment centre for business management. The results suggest that data, AI algorithms, and robots are the most important AI resources. These resources must be organized (e.g., leveraged, deployed) to cooperate with other pertinent resources, such as storage facilities and existing information systems, in order to develop significant AI capabilities. Learning, planning, and prediction are the three main AI capabilities. The capacity of AI to generate business value in terms of effectiveness (for example, labour productivity, space optimization), efficacy (for example, data analytics), and effectiveness for study and practise, the effects of comprehending these social informatics of AI are addressed for business management.

Keywords: *Business management, Artificial intelligence, Resource orchestration, Smart warehouse, E-commerce, Fulfillment center.*

1. Introduction

Artificial intelligence (AI) has seen a significant rise in use over the past few decades. In their early stages, AI was used to generate recommendations by both knowledge-based and expert systems [1]. AI has recently become more human-like and is now capable of learning, problem-solving, object manipulation, and physical space navigation as a result of advancements in big data, supercomputing, and machine learning [2].

Investment in applications involving AI is expected to skyrocket. 70% of businesses are expected to employ AI by 2030 [3]. Business is predicted to be driven by AI technology [4], with 75% of CEOs anticipating "AI to dramatically impact their firms within three years." Healthcare (Pan & Cui 2019) [5], education & manufacturing [6], retailing, and supply chain management [7] are just a few of the areas that have investigated AI applications. Additionally, governmental support on a worldwide basis has contributed to the increased adoption of AI. China spent around $12 billion in 2017, and it is anticipated that it would spend up to $20 billion in 2020 [8]. According to Dwivedi et al. (2019) [9], by 2030, AI is expected to contribute at least 20% of China's GDP.

Integration of AI into organisations is still challenging, despite growing interest [10]. The majority of AI projects eventually fall short of their goals [11]. Many firms are still adopting a wait-and-see strategy, delaying deployment until more is known about suitable AI tactics in business management. It takes more than just technical skill to integrate AI [12]. Integrating AI initiatives with current personnel and procedures are proved challenging for senior managers to manage business [13]. Similar difficulties with integrating AI into current workflows, integrating AI into existing processes, and managing the AI-augmented workforce have been noted in research studies [14]. Indeed, "organisations are approaching an environment marked by unheard-of managerial and intelligent machine cooperation during business [15]. For travelling across this difficult and uncharted terrain, there are no maps yet. There is still a dearth of research examining productive AI applications that might teach businesses starting their AI journey priceless lessons (Duan et al., 2019) [16].

1.1 Research Questions

In this investigation, the following research problem was addressed:

Q. How can the resources, aptitudes, and interactions of artificial intelligence be controlled to result in successful outcomes in AI applications?

Because successful implementations of AI in enterprises are relatively rare, we conducted a thorough case study on Taobao's Smart Warehouse, a top e-commerce fulfilment facility in China [17]. A fulfilment centre is an electronic commerce warehouse where orders are gathered, handled, and delivered. Warehouse management has developed into a vital component of logistics and supply chain management as a result of its significant effects on overall labour and time expenses.

Space limitations, labour shortages, shoddy layouts, and out-of-date Information Systems are major difficulties in warehouse management (IS). These problems are made worse by fulfilment centers, which frequently handle a lot of small packages and different products while dealing with strict delivery deadlines (like next-day or even same-day delivery; (Boysen, de Koster, & Weidinger, 2019) and drastically shifting demand. To address these issues, a variety of AI applications are being created, such as mixed-shelf storage, robots that move shelves, and picking assisted by automated guided vehicles.

In order to increase operational performance and order accuracy, this study looks at how Taobao's Smart Warehouse has successfully used these and other AI applications along with other important organisational and human resources. The findings shed light on the precise resources related to artificial intelligence that need to be coordinated in order to create capabilities related to artificial intelligence.

For this case study, the resource orchestration [19] viewpoint is pertinent and useful for three reasons in business management.

First, it's generally agreed upon that resources are a crucial element of warehouse management. With the aid of this theoretical viewpoint, we can identify the vital resources that must be organised in order for AI to be applied to warehouse management.

Second, the many capacities of AI to carry out complicated tasks have attracted the attention of both academics and practitioners. This theoretical viewpoint aids in focusing our attention on issues pertaining to processes, such as those pertaining to the capacity development process.

Thirdly, this theoretical viewpoint directs our attention toward understanding how resource orchestration affects organisational outcomes including performance, innovation, and value generation. We can find AI-enabled results in warehouse applications by comprehending its influence.

1.2 Contributions of study

1. This research seeks to comprehend how people, processes, and AI technology should be handled in order to properly produce value in business management

2. Understanding how organizational, human, and technological resources can be set up to produce AI-enabled capabilities that increase effectiveness and efficiency is made easier with the aid of the resource orchestration perspective in business management

3. According to the resource management for business, viewpoint, resource orchestration—which includes developing the resource portfolio (for instance, by acquiring resources), combining resources to create capabilities, and utilising capabilities—is the key to generating commercial value.

4. These ideas can be used to locate resources related to artificial intelligence and comprehend how they interact in applications of AI to create powerful capabilities in business management

1.3 Organization of paper

This paper's remaining sections are structured as follows: In Section 2, the theoretical foundations of the study are reviewed. The case study research methodology, a case description, and a conceptual background of the previously published works are then discussed. Section 5 presents the case analysis, and Section 6 examines its implications for research and practise. The study is finished in Section 7.

2. Literature Review

Loureiro et al. [20] (2021) offered an overview of recent work on artificial intelligence in the corporate domain and proposed a study plan. They first analyse 404 relevant publications from Web of Science and Scopus to highlight significant contributions to the field and the best venues for publication in order to show how research on AI in business has evolved over time. Then, using a text-mining technique based on Latent Dirichlet

Allocation, latent subjects were identified in the literature and extensively studied. Four key categories—the influence of AI on organisations, society, AI systems, and methodologies—were created by the study, which produced 18 themes. The main issues and developments as a result of their research were then covered, including those relating to automated systems, robotics, the Internet of Things, and AI integration, as well as law and ethics.

Knowledge Management Systems (KMS) were identified by Di Vaio et al. [21] (2020) as a contributing factor in the cultural shift toward the adoption of AI for SBM. Despite the significance of the subject, a detailed examination of the SDG-related AI and SBM literature was skipped. The bibliometric research uses a database of 73 English-language works with release dates ranging from 1990 to 2019. The results demonstrate that the innovation challenge took into account ethical, social, economic, and legal factors. Their findings also provided an overview of the body of research on AI and the SDGs that has already been done, taking into account the connection between the UN 2030 Agenda for SD and the development potential of AI, particularly SDG#12 which included the connection between AI and the cultural drift of the SBMs.

Goralski et al. [22] (2020) offer some early conclusions for management education and the business of running organisations in the midst of rapid technological and societal change. In order to examine the effects of AI on sustainable development with a focus on the progress of the SDGs, their research merged the views of corporate strategy and public policy. It provided some guidance for developing management skills and leadership for global sustainability.

Dhamija et al. [23] (2020) evaluated significant artificial intelligence research by eminent academics using search keywords and filters relevant to operations management, big data analytics, expert systems, agent-based systems, genetic algorithms, artificial intelligence, 1,854 articles have been pulled from the 2018-2019 Scopus database as of May 31. The results of the cluster analysis are concentrated on themes that are popular among recent and upcoming artificial intelligence experts. The following list includes some of the most recent clusters to emerge: sustainable supply chains, machine learning, operational performance, Industrial engineering/research and automation, technology adoption and green supply chain management, internet of things and reverse logistics, and artificial intelligence and optimization are all included in Cluster 1.

The importance of identity and access management systems in different organisations was examined by Mohammed et al. [24]. As an information security system, the IAM system typically includes a number of predetermined features. Authentication is crucial for establishing user identity for service providers who use IAM. In relation to IAM systems, they provided an overview of the research on intelligent authentication. The results of the study demonstrate that it is not feasible to create and implement an authentication system that satisfies all requirements. Users must have access to all applications, system software, databases, and other platforms with a defined identity and responsibilities in order to manage the complex IT environments of today. In order to provide and keep users, their strategy required users to memorise numerous passwords and IT staff to repeat work for each platform. The user is more likely to obtain unauthorised access to private information and other organisational resources as a result of decreased productivity. An alternative to Identity and Access Management (IAM) that incorporates artificial intelligence is a comprehensive and sophisticated solution. The numerous identities that each user possesses have been consolidated by businesses into a few, or better yet, one identity. Additionally, they were able to develop a single set of obligations, laws, regulations, and identity verification tools. To increase user and IT efficiency and ensure the highest levels of safety and compliance, their plan heavily automates IAM using artificial intelligence. They showed how the intelligent IAM can use artificial intelligence to speed up user authentication and identity management, two crucial processes.

According to Zhang et al [25] (2021) research, business strategic planning is crucial to an enterprise's survival and growth. To raise an enterprise's operational level, an internal management system had to be constructed in accordance with strategic planning and internal requirements. Their article conducted an examination and analysis of the internal workers' demands about the management system using the Kano model. The process and function of the enterprise internal IT service management system are designed to improve internal management, internal business processes, and the enterprise's competitive advantage based on these three dimensions of robot management, and integrated management, feedback channel management,. Industrial engineering/research and automation, operational performance and machine learning, development of sustainable supply chains, technology adoption and green supply chain management, internet of things and reverse logistics, and artificial intelligence and optimization are all included in Cluster 1.

Kumar et al. [26] (2019) explored the role of artificial intelligence (AI) in aiding personalized engagement marketing—an approach to create, communicate, and deliver personalized offerings to customers. Consumers are ready for a new journey in which AI was a tool for endless options and information that are narrowed and curated in a personalized way. They also provided predictions for managers regarding the AI-driven environment on branding and customer management practices in both developed and developing countries.

Using evolving business model archetypes, Garbuio et al. [27] (2019) conducted a timely and critical examination of AI-driven health care companies and identified the strategies used by businesspeople from across the globe to commercialise AI solutions. It identified potential value-creation areas for the use of AI in healthcare and suggests a method for creating business models for companies using AI in healthcare.

By examining some of the most important unresolved business challenges, Malali et al. [28] (2020) evaluated the dynamics of AI ecosystems in the banking and finance sector and how it was quickly emerging as a most significant disruptor. The sector's potential for AI may be seen from several angles, primarily in terms of its consequences and applicability to the operational environment of the banking and financial services business.

A succinct review of AI, contemporary challenges being addressed in its development, and an explanation of how it alters business models are all presented by Lee et al. [29] (2019). Their research of two businesses who used AI to improve their business models demonstrates the potential significance of this technology. They spoke on how corporate leaders can foster a creative AI-based culture, which reframes the process of developing AI-based business models. Businesses that effectively use AI might possibly change the global competitive environment by introducing disruptive innovations via their new business models and procedures.

2.1 Conceptual backgrounds

2.1.1 AI applications for managing warehouses of business

The basic objectives of AI are to comprehend the phenomenon of human intelligence and to create computer systems that can emulate human behavioural patterns and give information helpful for problem-solving. A large

range of application options with considerable effects on productivity and performance are made possible by AI's capacity to surpass the cognitive and physical constraints of humans (Dwivedi et al., 2019) [9].

Artificial intelligence (AI) is predicted to strengthen internal business processes, lead to wiser choices, enhance current products, free up workers for more creative work, develop new products, and pursue new markets. The three main ways that AI adds value for businesses are by automating tasks, producing fresh insights, and involving stakeholders in business operations, according to Dwivedi et al. (2019) [9].

There are several uses for AI warehousing. In retail planning and restocking management, for instance, AI can be used to comprehend and forecast sales trends (Mahroof, 2019) [17], AI can automate a wide range of manual tasks when human workers are physically unable to complete (Dwivedi et al., 2019) [30]. According to Risse (2019) [33], using AI alongside human workers in work processes is a practical way to get around labour force and workload limitations.

Although it is well known that AI can significantly enhance warehouse management, it is not clear how AI applications should be managed in conjunction with other current organisational components (Mahroof, 2019) [17]. Additionally, it has been suggested that more research be done using empirical research methods to give a more comprehensive understanding of actual AI applications (Duan et al., 2019) [16].

2.1.2 Resource orchestration view

RBV (resource-based view) pinpoint the unique, priceless, finite, and irreplaceable assets that could give a business a competitive edge, considers a company's organizational, human, and physical capital. Resource orchestration actions can be divided into three categories: structuring, bundling, and leveraging. Bundling is the use of resources to develop skills (such as stabilising, enriching, and pioneering); mobilising, coordinating, and deploying resources is referred to as leveraging. Structuring entails develop a resource portfolio through acquisition, accumulation, and divestiture. Resource orchestration research is divided into two basic categories.

One stream is the discovery of resource-focused behaviours in various contexts. In their investigation of the expansion of e-commerce in rural China, Cui et al. (2019) [31] discovered that technical platforms & product knowledge were used to create both individual and collective e-commerce skills.

This study contributes to both research streams by highlighting the essential resources related to warehousing AI applications, their orchestration activities, and the resulting AI-enabled outputs. This is in line with the recommendations of AI management experts, who urge businesses to adopt AI by utilising a variety of resources and developing the required skills. Because warehouses are typically considered as a combination of processes and resources, the resource orchestration approach is suited for studying e-commerce fulfilment centres.

3. Research approach

The case study technique is used in this research for three reasons. First off, this approach is especially helpful for exploratory research that address "how" issues, such as the one we were trying to address. There is presently a lack of innovative theoretical arguments for the use of AI, thus this method presents a possibility to fill that gap. Thirdly, the case study approach is especially well suited for comprehending processes in this research because it focuses on the process of how resources related to AI are coordinated to produce value in business management.

The Smart Warehouse operated by Taobao in Tianjin, China, is the subject of this case study. For Taobao's Tmall Supermarket, an online supermarket that sells food, drinks, household items, and cosmetics from both domestic and foreign brands, this warehouse functions as an e-commerce fulfilment centre. Over 80,000 square metres of space make up the large fulfilment centre. By using AI technology, the fulfilment centre has been able to deliver items the very next day to inhabitants of the Beijing-Tianjin-Hebei megalopolis while dramatically reducing labour expenses by 70%.

The following arguments support the use of a single-case study. First off, a single instance is usually used as a sample due to its revelatory properties, its value as an illustration of phenomena, or the unique access it offers to research data. According to Rayome (2019), 85% of AI attempts fail, hence the Taobao example highlights exceptionally effective AI applications that are both unusual in practise and understudied in information management research [32]. Another significant aspect of the business is that its fulfilment centre is located in China, the country with the biggest e-commerce industry in the world. Single-case studies are also helpful when there is a lack of theory for a specific occurrence and the example leads to novel ideas.

The Taobao case study demonstrates purpose & nature of resource orchestration, a notion that is presently being researched in the theories for controlling AI in business management. The nomological paradigm, which theorises AI management & application in organisations, is anticipated to benefit from this circumstance.

3.1. Data collection

For case study, information was gathered in 2 stages. Beginning in early 2021, the first phase concentrated on secondary data from sources like print media, business websites, and online articles. These data assisted us in preparing for the collection of primary data by providing "a rich set of data surrounding the specific research issue, as well as data capturing the contextual complexity."

Speaking with managers and staff at Tmall, Taobao's online market and fulfilment centre for e-commerce, was the second stage. At the fulfilment center, we additionally witnessed the AI applications in action. We had a conversation with MEGVII, the architect of Taobao's AI technology, to learn more about the creation of the AI applications. A total of 25 informants provided us with data (see Table 1).

Table 1: Interviewees List

Organization	**Description**	**Interviewee Role**	**Interviewee Count**
Tmall	Taobao's online grocery store division, which manages orders via the fulfilment center, was investigated.	Fulfillment center manager	1
		Worker	7
		Operations Director	1
		Operations Manager	1
		Operator1	3
ALOG	Newly acquired logistics service provider running the fulfilment centre for online sales	AI engineer	2
		IT engineer	3
		IT manager	1
		Vice President	1
MEGVII	A provider of AI solutions is creating AI apps for an e-commerce fulfilment facility.	Product manager	1
		Robotics engineer	4

In order to comprehend the capabilities & resources connected to AI applications as well as the beneficial effects of AI application, interviews primarily focused on the following crucial questions:

• What AI applications are currently being used in fulfilment centers?

• What function does each applications serve?

• How were the AI programmes chosen? Why weren't more applicants chosen?

• How much does each application affect or add value to the system?

• How are AI applications interconnected?

• What tasks, in relation to AI applications, are carried out by human workers?

• What influences how effectively AI applications function?

• How have incorporating AI applications changed the organization, structure, processes, and practices for business management?

• What resources and capabilities are currently being impacted by AI applications, or have they already been impacted in business management?

Each interview was digitally recorded for 60 to 90 minutes, after which transcriptions were made for data analysis. We added to the data while conducting the in-person interviews by snapping a few quick videos, photos, and field notes. The archive field videos, photos, notes, transcripts, data allowed us to maintain an adequate level of data triangulation.

3.2. Data evaluation

To produce empirical data and theoretical conceptions for capturing an exceptional event, data collection and analysis were done concurrently. We carried out 3 iterative rounds of data analysis in accordance with methodology used in case studies.

From the standpoint of resource orchestration for business management, we first looked through and coded all the information that was accessible, including interview transcripts and secondary data. With relation to AI applications, we specifically emphasised data on resources, capabilities, the management of these links and interactions, as well as the practical ramifications. Regular meetings to evaluate freshly emerging first-order concepts were organised to guarantee uniformity in the code.

In the second stage, we contrasted the new themes in terms of resource orchestration for business management by combining comparable first-order ideas to create second-order themes. Utilizing data and system resources is an example of a first-order notion that was classified under the 2nd-order topic "leveraging data and system resources," where "leveraging" refers to resource orchestration activity that has been found in prior study. More crucially, concepts that didn't suit the prevailing viewpoint of resource orchestration led to the new theme developments. In the case of order packings, for instance, we saw the use of AI applications dramatically

increased human employees' capacity to prevent errors while also allowing continual AI application capabilities updates based on input from human workers. The unique concept of "AI-human ability coevolution," which suggests that abilities are not independent, was born out of this conundrum.

Thirdly, in order to create a framework for managing AI applications in business environments for business management, we logically arrange the second-order topics. The framework focuses on the ways in which human and artificial intelligence (AI) capabilities are intertwined and coevolving to provide economic value, as well as the resources and skills associated to AI that support the effective use of AI in organisations. Then, by going back to the data and coding, the framework was continually improved until theoretical saturation was reached. The following sections go into great detail about the case and the case analysis.

4. Case history

To help Taobao serve the millions of clients in the Beijing-Tianjin-Hebei megalopolis who are embracing online shopping, the e-commerce fulfilment centre was built. Customers wanted trustworthy next-day or even same-day home delivery when they began making regular purchases online for business management. Eventually, this desire developed into a noteworthy distinction that distinguished rival e-commerce systems. The following were the main impediments to prompt delivery that the fulfilment centre manager listed:

"The number of orders received has increased sharply, peaking at 150 thousand orders daily. To meet the growing need for diversified goods, we had to constantly increase the number of SKUs [stock-keeping units] in our Smart Warehouse. At the beginning, we had roughly 10 thousand SKUs, and the number has increased to more than 30 thousand now. This growth trend and the dynamic market have brought great complexity to demand forecasting, inventory planning, and warehousing. For instance, as the number of SKUs increased, the space for storing and picking orders had to be used more efficiently...The workload of workers also increased...We had to recruit more workers, which add to the difficulty and cost of human resource management. Moreover, it was not easy to recruit workers given the harsh work conditions and high work intensity"

Taobao decided to conduct research on AI solutions for business management to address these problems in collaboration with MEGVII, an AI solution provider known for its image recognition technology, and ALOG, a logistics service provider skilled in cutting-edge technologies. During a four-year transition, the fulfilment

centre allegedly integrated significant AI application for boosting effectiveness & efficiency of crucial business process for business management:

"We now have more than 500 robots working collectively in the Smart Warehouse. AI applications have helped to reduce manpower by more than 70 % and dramatically increased the accuracy of order picking. As a result, we can now complete an order-picking process within three minutes and deliver most orders to consumers accurately within twelve hours"

Together with MEGVII, a provider of AI solutions known for its image recognition technology, and ALOG, a logistics service provider proficient in cutting-edge technologies, Taobao decided to conduct research on AI solutions to address these issues. The fulfilment centre allegedly integrated significant AI applications during a four-year transformation to increase the effectiveness and efficiency of critical business processes.

4.1. Storing of goods

For storing stocked items from supermarket suppliers, the Automatization Tridimensional Storehouse is the main AI application. The fulfilment center's manager provided the following examples of how it differ from conventional structure:

"Unlike traditional structures that have spacious aisles for the manual handling of goods by human workers and forklifts, the ATS more fully uses both land and vertical space, automatically accesses goods without human intervention, and rationally organizes goods to maximize access efficiency"

To be more specific, materials that are supplied to the fulfilment warehouse are put on a pallet and transported to the ATS using a conveyer belt. The entrance to the conveyer is equipped with weight sensors, visual recognition sensors, and barcode scanners, enabling swift identification and updating of stock-in information for the pallet's identity, three-dimensional size, and total weight in the warehouse management system. The pallet is then relocated to the storage location that earlier data has shown to be the most beneficial. The WMS can determine the requirement for replenishment and provide instructions to the Warehouse Control System by forecasting the demand for the products. In order to maintain a seamless order-picking process, the WMS and WCS collaborate to provide the ATS with instructions on how to store and refill products.

4.2 Order selection

AGVs for forklifts, "order to man" (O2M) AGVs, and "goods to man" (G2M) AGVs are the main AI applications in order picking for business management. As soon as an order is received, the WMS uses stock-in data (such as 3D measurements) and the packing algorithm to choose the best packing box. By selecting the appropriate choice, you can save money and the environment. The barcoded box is then manually selected and put on the shelving rack that an O2M AGV is transporting. MEGVII, a robot engineer explained:

"It looks like a large robotic vacuum cleaner equipped with Wi-Fi and self-charging functions. It is able to haul goods weighing up to 500 kg and move at a speed of 1.5 m per second. Each shelving rack can carry up to 12 order boxes at a time, when the robot completes order picking for all the orders, they are moved to the packing zone"

In the first zone, there is an O2M AGV at work. Here, order boxes approach workers who are instructed to pick up items from specific shelves that are positioned next to one another by their personal digital assistants. Items that are frequently bought together are arranged adjacent to one another on the shelves. With this technique, human workers' travel distances are drastically cut.

G2M AGVs are then deployed in the second zone, where they transfer the order boxes there. Products are maintained in boxes and transported to workers' designated workstations in this section for picking. An MEGVII robotics engineer provided the following explanation of how this kind of robot functions:

It resembles O2M robots in appearance. An important distinction is that while a G2M robot manages multiple boxes simultaneously, an O2M robot only keeps track of a limited number of order boxes. A G2M robot locates the item that an O2M robot requests from a storage box in the second zone, brings it to a worker, who selects it and places it in the order box.

Forklift AGVs handle larger objects in the third zone. These robots, like G2M AGVs, deliver the necessities to the workplace so that employees can pick them up and arrange them in the appropriate order boxes. All order pickup robots make use of real-time data gathered by laser sensors. The WCS analyses this data utilising a robotic motion control algorithm to prevent actual obstructions, traffic jams, and accidents.

4.3 Order packaging

During this stage, the order boxes containing the chosen products are inspected and packaged. Human personnel must scan the barcodes on each order package and all of the products within in order for the WMS to compare and check them automatically. The technology tells the human employee when a discrepancy is discovered so that any mistakes may be manually corrected. A 3D packaging algorithm is utilised to pack the order box once a human employee for business management confirms that the selected order is proper.

The algorithm makes sure that everything gets crammed in and makes the most use of the given box space. For instance, the strategy ensures that delicate items are put on top while things that are prone to leak are placed at the bottom. Then, conveyer belt are packed in boxes that will be shipped overseas.

Table 2 provides a list of the uses of AI in the goods storing, order picking, and order packing for business management

Table 2: Taobao's E-commerce fulfillment center for AI applications for business management

Process	**Goods storing**	**Order Picking**	**Order packing**
Descriptions	Collecting stock-in data and improve storage options.	Find the ordered items quickly and accurately from storage	Verify the items chosen for each order and bundle securely
Robot/ Facility/ Equipments	Scanners, sensors, ATS	AGV, Forklift AGV, "Goods to man", "Order to man" AGV,	Scanners
Algorithm	Location recommendation, Sales forecasting.	Order wave combination, 3D packing, route planning, route scheduling, robotic motion control, Automated Guided Vehicle (AGV), Warehouse Control System (WCS), Warehouse Management System (WMS), location recommendation, Sales forecasting.	Warehouse Management System
Data	Real-time order data, real-time stock-in data, Historical sales.	Real-time operations, Real-time order data, real-time stock-in data, Historical sales	Stock-in data, order data

5. Case studies

To make significant and novel discoveries, the case was investigated using the resource orchestration viewpoint as a theoretical framework. Overall, Taobao's successful application of AI raises the possibility that different resources may be brought together through operational procedures in a variety of ways to offer a variety of AI capabilities. More importantly, a variety of interactions between human and AI capabilities result in AI-enabled outcomes. Our case study at Taobao's e-commerce fulfilment centre concentrated on the business management for three business processes of item storage, order picking, and order packing, as emphasised by the centre management:

"We structured the Smart Warehouse into three processes and allocated a distinctive zone for each process. As each process has a different set of requirements and tasks, we adopted different AI applications that called for unique ways of organizing workers to achieve a multitude of beneficial outcomes"

5.1. The management of resources in AI development

Our case study serves as an example of how the basic skills of the smart fulfilment centre were configured to deliver AI capabilities for business management. Given the significance of our research topic, this study emphasises the importance of AI capabilities and provides information on the resources that are available as well as resource-focused development plans. To automate the process of keeping products, the ATS was developed to take the place of the manual storeroom.

Real-time stock-in data of packaged items must be automatically collected by sensors and scanners and synced with the WMS for additional analysis for the ATS to work as intended.

A worker clarified:

"Before introducing the ATS, workers had to manually record the information of incoming goods for further storing, which was time consuming and error prone. Now, AI technologies are able to collect the information effortlessly and instantaneously when goods enter the ATS... It automatically determines the kinds of goods being stored and the quantity. The additional data captured through sensors, such as volume and weight, can also be used for further storage planning"

According to this quotation, relevant data was organised so that the fulfilment centre could automatically record all of the received goods, which led to the development of real-time perception as an AI capability for business management. Additional data sources (i.e., historical sales data and real-time order data) were also acquired by docking with Taobao's sales database, which fueled the creation and development of algorithm resources like sales forecasting algorithms and location recommendation algorithms. An AI engineer explained how big data and algorithms work in the fulfilment centre as follows:

"Supported by AI technologies, we have a so-called "intelligent brain" in our smart fulfillment center, which is mainly supported by big data and algorithms. The algorithms are developed and trained using historical big data. By analyzing real-time big data, different algorithms are responsible for supporting the performance of "intelligent brain" functions, including planning tasks, optimizing the operating efficiency of machines, coordinating machines and humans, making autonomous decisions about overall operations, and adjusting operating strategies based on real-time feedback"

As a result, algorithm & data resources are connected to system resources after structure. Big data is used as an input by systems, and algorithms are used as processing aids. Human personnel receive the analysis' findings so they can work together or manage other systems. According to a computer science (IT) engineer who specialises in the ATS, the following is how the outcomes are generated in the big data and algorithm-based systems:

"We used big data on historical sales and machine learning to develop and constantly optimize the algorithms for sales forecasting. The WMS is connected to the real-time order database, which helps to identify goods with a high sales trend and high replenishment frequency. Such goods are stored near the exit of the ATS to minimize the retrieval time

...The weight and size of goods on a pallet also influence the location of its storage. For instance, the total weight of goods on a rack must not exceed its maximum capacity... ...Synthesizing the sales forecasting algorithms, the allocation rules, and the related data, the location recommendation algorithms can allocate an optimal storage location as soon as barcodes are scanned. The locations of goods are dynamically adjusted based on the changing sales trend"

As a consequence, by integrating system resources with data and algorithm resources, it was possible to analyse and forecast the sales trend as well as design the arrangement of goods in the ATS. The WMS also provides the WCS with directions on how to move objects based on the outcomes of the real-time location recommendation, and the WCS subsequently tells the ATS to carry out the instructions. As a result, it is possible to coordinate system resources (like WCS & WMS) & facility resource to automatically manage objects while storing things.

Robots are used in the order picking process for business management to reduce labour costs and increase output. As real-time operational data is gathered by the robots' sensors, the data resources increase in addition to the data on products and orders. In order to support the operation of robots and the interaction between robots and human workers, a variety of new algorithm resources, such as 3D packing algorithms, order wave combination algorithms, route planning algorithms, robot scheduling algorithms, and robotic motion control algorithms, are created based on the integration of these data. Additionally, by combining system resources (such as the WMS and WCS) with data and algorithm resources, system resources with robot and human resources, and so forth, new AI capabilities for business management can be created.

In order to divide things into three groups based on their sales trends and find connections between consumption patterns, the capability for analysis and forecasting was specifically designed. This is made possible by combining system resources with data and algorithm resources. The ability to combine objects for choosing was shown by an AI developer:

"The classification is based on historical sales data and the algorithms for sales forecasting. Type-A goods are prospective best sellers, which include about 2000 SKUs, with a high probability of being picked for orders in the fulfillment center. Type-B goods have a relatively lower probability of order picking than type-A goods, covering roughly 6000 SKUs. Type-C goods are those with the lowest anticipated sales, constituting about 27,000 SKUs. The classification results in the WMS system guide the goods layout for picking".

As a result, a planning skill for organising the various goods is created. In the interim, it is possible to choose the right box size for an order by fusing the order data, the goods data on volume, and the 3D packing algorithms with the WMS system. Additionally, by combining data, order wave combination algorithms, and route planning algorithms with the WMS system, it is possible to organise the selection of orders into waves to

shorten picking distance and time and to determine the best route between the three subzones. According to a MEGVII robotics engineer:

"With the order wave combination algorithms and the real-time order data, in the WMS, orders that could optimize picking efficiency and shorten the O2M robot's travel time are planned into a wave in the same robot. Furthermore, in the WMS, combining order data and goods data with route planning algorithms, the route of each robot for picking items located in different places is also planned in advance to further shorten the order-picking time"

The data already available is improved by real-time operational data provided by robots. Robots must be integrated into both the WMS and the WCS in order to develop the organising and controlling abilities necessary to coordinate the group cooperation of robots, operate the robots in real-time, and develop the moving capabilities necessary to move either the orders or the objects by the robots. Examples of these algorithms include robotic scheduling algorithms and robotic motion control algorithms.

As the chosen order is being packed for international shipping, it is examined once more. Using data resources (i.e., the data on orders and picked goods) and system resources, this technique develops the analytical capacity on which the linked data are compared to assess the accuracy of the chosen order. If the order is accurate, WMS will then construct the planning skills based on the data on orders and commodities to recommend the best packaging techniques for the order.

Human resources are dispatched, such as managers of fulfilment centres, to investigate alleged order-related mistakes. The coordination of data resources, algorithm resources, system resources, and human resources results in the learning capability that can improve human-AI collaboration for business management, advance data acquisition, processing, and analysis, optimise algorithms, change systems, and advance data acquisition, processing, and analysis.

The research demonstrates how data resources and algorithm resources may be generated as the foundation for developing AI capabilities for business management by integrating the resource orchestration for the development of AI capabilities throughout the three stages. The algorithms are powered by big data from several sources, which makes it possible for them to be incredibly efficient at analysis, forecasting, planning, decision-making, organising, and control. By integrating system resources with those for algorithm optimization and data

enrichment, these special functions may also be used to manage and direct the fulfilment centre. In order to control the WCS, which serves as the conductor and controller and gives instructions to the robots, which serve as the executors, the WMS assumes the roles of analyst, planner, and decision maker for the systems. Finally, all required resources are coordinated to provide AI capabilities for the efficient operation of the smart fulfilment center.

5.2. The capabilities of humans and AI are working together and developing together

The case study research demonstrates how the developed AI skills must interact with human capabilities in each stage of the fulfilment process in order to properly deploy AI for business management. Previous research on AI examined how it related to the human workforce, making the case that it might alter the nature of work and even have an impact on how people are treated at the workplace. While some studies contend that artificial intelligence (AI) may endanger the employment of people, others contend that AI should be used to supplement rather than replace the work of people. With an emphasis on how their distinct skills interact and co-evolve, this research illustrates the reciprocal impacts of AI and the workforce. A Tmall fulfilment centre manager outlined the company's perspective on the interaction between AI and humans there:

"From our perspective, humans and AI are complementary in the completion of both cognitive and physical tasks. In our fulfillment center, they work symbiotically to supplement and enhance each other's capabilities"

When storing items, an ATS powered by AI is employed for business management to manage the steadily growing number of SKUs rather than a conventional storehouse. Due to the organisation of the incoming items in the storehouse and their processing to store and remove for later order picking, the operation in a normal storehouse required a lot of labour. Where the commodities were positioned in the conventional process was largely determined by the employees' habits and prior experiences. The initial organisational capacity of human employees in the smart fulfilment centre is strengthened by the recently developed AI capabilities, such as the capacity to perceive in real-time, analyze, forecast, and plan. A computer engineer described the enhancement:

"Previously, storing workers arranged the received goods based on their estimation of the size and weight of the goods, locating them randomly or based on their previous experience. Now, although AI refers to

some rules and experience of the storing workers, it is more efficient, as it is based on more aggregated data and more rigorous and dynamic analysis. Surpassing human workers' arrangement, AI can also predict the probability of goods retrieval and accordingly plan the layout of goods and the future actions for retrieval to increase efficiency and save time"

The facility in the ATS uses its handling capacity to completely replace the handling capability of human workers in order to automate this process by following the directions provided by the aforementioned AI capabilities for business management. The manager of Tmall fulfilment centre claims:

"Due to the consideration of labor safety, human workers are all excluded from the storing zone. In the ATS, machines, directed by the "intelligent brain" supported by AI, completely replace workers in handling goods"

During the order choosing process, In the fulfilment center, more than 500 robots and AI-based systems are used to supplement the initial picking process. In the past, retrieving mobile shelves with order boxes on them required hiring human workers to find the right products and load them into boxes. Throughout their shift, they went back and forth in the order-picking area to complete each order that was on their shelves.

A new working mode that was centred on symbiosis between humans and robots was developed and put into place during this process using AI for business management. To create a logical and highly effective layout in the three subzones based on the categorization of items, the created AI capabilities—i.e., analysis, forecasting, and planning capacity—first optimise human organising capability.

The operations supervisor asserts:

"Workers previously put some goods that they thought were more likely to be in an order together for layout. This was based on their experience and was sometimes helpful. However, buying trends are dynamically changing, but workers' experience is relatively fixed. Yet, the AI-enabled functions for analyzing and forecasting trends of the WMS are able to automatically identify the changing trends, based on which the layout can be planned in a better way"

The second set of AI capabilities produced by resource orchestration for order picking includes the capacity to organise and control the picking activities, including robot operation and human worker

collaboration. It also includes the capacity to select an appropriate box size for later picking an order. The smart fulfilment centre may be managed and operated more effectively with the aid of this AI capability for business management, which also improves human managing and operating skills.

Third, even though using robots has reduced the amount of walking that human workers must do significantly, robots can only transport items or place orders for boxes. In order to complete the order picking process as a whole, human workers' capacity to select and place particular items in order boxes complements the robots' mobility abilities.

According to a MEGVII robotics engineer,

"Robots still have some limitations. Although they can automatically move order boxes or items of goods, it is quite harder and more expensive for them to achieve the precise actions of selecting and picking. However, human workers can easily perform these actions. When the items of goods are moved by robots to workers, they can even double check the correctness of the items before putting them in the order box...We consider this a perfect collaboration in which robots are responsible for the simple moving action, which requires a lot of workload, while humans are responsible for the complicated selecting and picking action, which requires fine movements"

In Order packaging, following inspection for packing the picked orders was done. The AI's analysis power first compares the data on the orders and selected products in order to direct the packing staff's capacity to ensure accuracy and guarantee that the orders are correct. The linked 3D packing algorithms and data-based planning capability also direct workers' packing abilities to logically pack items in order boxes. At the fulfilment center, a packer explained:

"The computer (an AI-enabled system) will only need to scan the items in a picked order to help me determine whether they match the order or not. On the screen, there is a warning if it is incorrect. I then report it to my colleagues and give them the box to continue processing. If it's accurate, a 3D image of the order box with the simulated locations of all the things in it will appear on the screen, allowing me to quickly complete putting the items within".

Second, employees from the fulfilment centre are dispatched to look into the error links and address any problems they uncover. Therefore, the ability of humans to solve problems helps AI's capacity to learn and adapt the process, which includes human-robot collaborations, systems, algorithms. The operations manager responded by saying:

"In the last process, the operators also play a vital role in maintaining the smooth operation of the fulfillment center. Problems in any links of the fulfillment process may cause serious consequences for operating efficiency and order accuracy. Discovering and addressing issues in a timely manner is especially significant. The operators' capability is more flexible and agile for solving these unexpected problems, which will enable the use of AI in a virtuous cycle"

By synthesising this relationship into three stages, AI capabilities interact with human capabilities in a variety of contexts and circumstances for business management. In the case of storage, for instance, the restricted human capacity for handling and arrangement really limits space utilisation and raises the possibility of human damage in the storehouse. In order to make the most use of space and maintain workplace safety, AI capabilities both augment and replace humans' handling skills. As a result, AI in this process mostly serves to replace human labour. The heavy workload of human employees throughout the picking procedure is the main problem. In this instance, human choosing and selecting skills work is in tandem with AI moving abilities to successfully execute practical order-picking duties. On the one hand, AI capabilities maximise people's organisational skills and ability to run the fulfilment center for business management. As a result, AI and human workers are collaborators in this process.

Order evaluation, which includes both inspecting the selected orders and identifying any gaps in the AI-enabled process, is the most crucial activity in packing. The development of the AI is aided by human problem-solving skills, which in turn guide human checking and packing abilities. As a result, in this process, humans act as the AI's investigators and problem-solvers, and AI acts as their support for business management.

5.3. Achieving results for fulfilment procedures using AI for business management

According to the data analysis, through resource orchestration and the interaction of AI and human capabilities for business management, AI enables a change in the fulfilment process to solve the present issues warehouses are facing and to improve them. Although considered as a potentially valuable technology for meeting needs, Mahroof (2019) [17] contends that prior research has paid little consideration to the potential of AI technology and its specific consequences in the context of meeting those needs. The study's conclusions give an overview of the results for each of the three procedures at the fulfilment center.

The act of storing goods is automated by artificial intelligence: Given that a fulfilment centre is used to store products and choose things for orders, space resources are always important to fulfilment and limit the size of the centre. An employee at the fulfilment facility described the primary justification for adopting AI to automate the procedure in terms of space:

"In the traditional storehouse, considering the safety of handling workers and limitations on the working range of forklifts, the number of layers of goods racks was constrained to five. As the number of SKUs in the fulfillment center was increasing rapidly, the space and labor for storing goods became insufficient. However, the new one (ATS) has dramatically addressed this issue. The process of putting on and pulling off goods is totally automated, without any human workers working inside it. Thus, the dimensional space of the fulfillment center can be fully utilized for storing, as the layer number of racks can reach more than ten, being filled below the ceiling height, and the previous aisles for the activities of workers and forklifts can also be omitted"

Additionally, Mahroof (2019 [17]) includes human resources as one of the elements that might boost or lower a fulfilment center's performance since fulfilment has been recognised as a process that is centred on people. AI capabilities improve human capacity to organise and replace human ability to handle in the smart fulfilment centre by coordinating associated resources. By automating the process and doing away with the necessity for human personnel in the storehouse, the ATS was successfully designed to replace the conventional storehouse and its storage techniques. ATS greatly reduces the need for human resources by automating processes, so the fulfilment centre only requires a small staff to handle receiving items and enter them into the ATS. By introducing levels of merchandise racks and removing the previously required lanes, the ATS also lessens the possibility of human harm and may finally utilise all of the available space. Additionally, AI enables

the planning of layouts in real-time using data-based forecasting and analysis, which improves the effectiveness of facility resources (like ATS) while processing items for choice of future orders.

AI enhances the selection process when choosing an order: Order picking traditionally has been viewed as being very labor-intensive, requiring a large staff and a lot of work. An employee at the fulfilment centre explained:

"Previously, the order-picking workers always complained about their heavy workload, as they needed to drag the shelf with order boxes running all over the picking zone to pick different items for the orders throughout the work shift. This is one of the major reasons for the high turnover rate in the fulfillment center"

Most of the movement labour that was formerly done by human employees is now done by AI robots. The amount of walking required by human employees has been drastically decreased, which lessens their burden. While this is going on, business management is done using artificial intelligence (AI) that substantially minimises the possibilities accessible to workers and instructs them to choose certain things for orders, which lowers the risk of human resource mistakes. Instead of allowing picking staff total control over order selection, this is done. Because people and robots work together to improve one another's skills, both human and robot resources are used more effectively.

AI transforms the packing process during order fulfillment: Human employees now concentrate on mistake rectification rather than checking now that the WMS with AI has changed the checking stage for business management. The WMS assists operators of fulfilment centres in identifying incorrect linkages so they may fix problems and guarantee the fulfilment centre runs smoothly. To make the fulfilment centre smarter, the provided error statistics are then used to optimise the facility/robot, facility/algorithm, algorithm, system, and human resources.

The operations supervisor explained:

"The smart fulfillment center has its own "evolution mechanism": the system automatically collects and stores the reported error data, based on which periodic analysis is performed to evaluate all the links and resources and to provide some suggestions for improvement. Thus, we can continuously optimize all the relevant resources and, ultimately, the process to make the fulfillment center smarter"

Packaging has also changed as a result of AI applications, making it possible for anyone, not just professionals, to use a logical process to pack items effectively and securely. A fulfilment centre employee who handles packaging made the comments:

"Before applying AI, I had to consider how to pack all the picked items in the box based on my own experience. The box size was estimated and selected by the order pickers based on their experience. Sometimes, I found that a box was too big and that too much room was left, while other times, it was too small and I needed to repack the items in a bigger one. Now, with AI, I only need to follow the instructions shown on the screen. The box size is selected by AI before order picking, and its room can be fully used for packing. AI also suggests the positions for some particular items, for instance, the ones that are fragile or easily leak"

This study demonstrates how the orchestration of AI-related resources and the interaction between the AI capabilities and human skills created help to advance past the limitations of the original resources—space—by aggregating the AI-enabled outputs across processes. For the traditional method of fulfillment, resources and human resources are essential (Mahroof, 2019) [17].

On the one hand, AI-enabled automatization and augmentation enable the full utilisation of the already available space resources, enabling the storage of more goods for business management. However, the process revolution brought about by the combination of humans and AI frees up human resources, allowing them to focus more intently and more effectively on specific tasks. New resources for the usage of AI (such as robot resources algorithm resources, data resources) when the checking phase is added to the iterative fulfilment process, are also optimized.

6. Discussions

How artificial intelligence (AI) resources, abilities, and connections may be managed to achieve successful outcomes in AI applications for business management was the subject that this research set out to address.

We make a number of significant discoveries and generate ideas that may be further researched by taking a closer look at the effective AI applications at Taobao's e-commerce fulfilment centre.

According to our research, the three main AI resources fostering the development of AI capabilities are data, AI algorithms, and robotics for business management. Data from several sources, in addition to the typical

warehouse resources, had a substantial influence on the case study's capabilities for analysis, forecasting, planning, and decision-making. In order to identify patterns, predict the future, and learn new things, AI consumes enormous volumes of data (Borges, Laurindo, Spnola, Gonçalves, & Mattos, 2020; Sipior, 2020) [35] which is correct.

Previous research has demonstrated that the availability and dependability of data are being used to understand and examine the effectiveness of AI (Lopez-Robles, Otegi-Olaso, Porto G., & Cobo, 2019 [37]; Ranjan & Foropon, 2021 [38]). Algorithms are also important since they were created to quickly analyse data and apply it in Taobao's Smart Warehouse for real-time optimization and decision-making. The example demonstrates how algorithms act as "the fundamental building blocks" of AI (Dwivedi, Ismagilova et al., 2020 [39]; Eldrandaly, Abdel-Basset, & Abdel-Fatah, 2019 [40]). Robotics is employed to realise the benefits that data and AI algorithms may provide. Our case study demonstrates how AI robots can do boring, risky, and repetitive tasks while enhancing the working environment for human workers, which has been widely hailed as an advantage of AI robots.

The importance of these resources is best summed up by the following phrases:

Proposition1:

New AI capabilities can be developed using robots, data, and AI algorithms for business management. This case study indicates that the development of powerful AI capabilities was aided by the coordination of AI resources with other resources.

Our study identifies the organising, bundling, coordinating, improving, pioneering, utilising, and deploying as the primary orchestration actions. Coordination of non-AI resources like storage facilities and human resources is a common component of these endeavours. For instance, it is crucial to coordinate data, algorithms, and storage facilities in order to store objects in the best possible location. These results support past research showing that little value is produced by simply owning resources (such as data, algorithms, robotics, and systems).

Our study further advances the theory behind AI applications for business management in organisations by demonstrating how investments in AI resources may result in the development of powerful AI skills like

predicting, planning, and learning. More importantly, our results widen the view on resource orchestration by identifying novel orchestration acts.

Therefore, we suggest the following:

Proposition 2:

Strong AI capabilities are developed via the coordination of linked resources and AI resources for business management. Additionally, we discovered that human skills and AI capabilities interact and co-evolve to affect company success. A contentious topic in both theory and practise has been the interaction between AI applications and human labor. Several studies have expressed worries about the widespread replacement of human labour by intelligent automation, despite the fact that AI can think and behave like humans. (Muhuri, Shukla, and Abraham, 2019) [47].

This case study discovers that there is potential for co-evolution between humans and AI in the workplace for business management. In order packaging specifically, human employees handle more orders as AI improves their checking and packing skills. Human workers also constantly offer input regarding false negative mistakes, which boosts the AI system's accuracy. Both human and AI workers grow in their ability to learn new things and solve problems over time. The efficacy and efficiency of the work are improved by this co-evolution. As they acquire experience working together, they complement and increase one another's strengths at work rather than competing against one another.

By expanding our knowledge from the perspective of capacity interactions and co-evolution, the task-based approach research—which aims to provide a more complete understanding of human-AI interdependence—furthers its contribution. Particularly, the interaction finding highlights the requirement for task-aligned AI application and development for business management. According to a new study, AI should be used to automate repetitive, dangerous, and time-consuming tasks while human employees should concentrate on higher-value tasks that require their knowledge and creativity.

We make the following assertions in light of previous research and our findings:

Proposition 3: AI capabilities must coevolve with human abilities.

Proposition 4: Depending on the task, AI and human workers will interact and develop together for business management.

By automating, enhancing, and transforming important business processes, this case study demonstrates how AI resources and capabilities in AI applications contribute to corporate performance in terms of both efficiency and effectiveness. An excellent illustration of how AI capabilities advance is Taobao's Smart Warehouse, which streamlines the process of product storage by bringing together AI and other relevant resources. This automation boosts productivity in terms of space use, human work, accident and injury hazards, and warehouse facility optimization. Given the frequent turnover and greater attention to labour rights in the warehouse industry, the skills involving human labour are particularly important (Mahroof, 2019) [17]. Additionally, order picking efficiency is increased by AI skills like forecasting and decision-making for business management, which minimise labour costs and human error while maximising robot utilisation. In general, automation and augmentation free human workers from easy, routine tasks and advance them up the value chain so they can concentrate on harder, more creative jobs. Since the packaging method has been improved, even less experienced staff can now pack items correctly, the order packing process is also improved by the co-evolution of AI and human skills. When viewed from the perspective of resources, the ideas of automation, augmentation, and transformation add to the body of knowledge already available on the value of AI for business management, which is the main factor driving investment.

The proposition that follows expresses these ideas:

Proposition 5:

By automating, enhancing, and changing crucial business processes, AI applications increase an organization's efficacy (e.g., labour productivity, space optimization), efficiency (e.g., error reduction), and effectiveness.

6.1 Contributions to theory and consequences

This research has significantly enhanced the field of study. The resource orchestration method provides a helpful starting point for identifying important AI resources and related resources as well as for comprehending how they should be linked to provide potent AI capabilities for business management. Given how AI applications are

managed within organisations, this topic is quite current. Our research examined how AI with business management works and how it interacts with other systems, processes, and people in order to be useful in the workplace. The viewpoint of resource orchestration allowed for this. More crucially, we discovered that if AI capabilities were managed so that they co-evolved with human skills, they could be continuously improved in a positive feedback loop. Without the resource orchestration perspective, it could have been simple to overlook the potential for long-term development of AI capabilities and the relationships between AI technology, other resources, and non-IT talents for business management.

As one of the earliest empirical studies on commercially successful AI applications, this study's conclusions may also be a helpful place to start for future empirical investigations. Based on data gathered from Taobao's extensive experience utilising AI applications in a demanding environment, we came to the conclusion that data, AI algorithms, and robots are the three primary resources connected to AI for business management. To build AI capabilities for business management, data resources should be combined with algorithms, robotics, and human resources. The three primary purposes of AI are planning, predicting, and learning. These AI capabilities can also be used to generate economic value by automating, enhancing, and changing business procedures to make them more fruitful, secure, and effective. The beginning point for additional study that aims to ascertain how these resources, capabilities, and desired results contribute to corporate value may be this collection of resources, capabilities, and outcomes. uture research may, for instance, analyse the effects of various resources and abilities to assess their relative influence on company outcomes as AI applications grow more widespread for business management.

Thirdly, we discovered that several skills may co-evolve in a way that strengthens each one over time for the theoretical development of the resource orchestration viewpoint. At Taobao's fulfilment centre, human employees used their expertise to help AI systems recognise or forecast faults more correctly, and AI skills for business management boosted human employees' ability to prevent errors. Through this learning, contact made it possible for both human and AI capacities to grow, creating a symbiotic capacity that is greater than the sum of its parts. By considering the long-term co-evolution of capabilities in value creation in addition to resource and capability interactions, this finding opens up the possibility of expanding the resource orchestration approach.

Fourth, AI research for business management is impacted by the co-evolution of human and AI talents, which acknowledges that AI for business management may assist to overcome some of the limitations of human workers or perhaps replace them. Our research indicates that when human employees are given the chance to contribute to the ongoing education of AI systems, humans and AI may progress together as opposed to just cooperating. The task-based research strives to give a more thorough knowledge of the interaction between humans and AI gains a new perspective from this result (Rai et al., 2019 [48]).

6.2. Practical Implications

The case study's conclusions offer some practical advice for handling AI applications in commercial settings. The Taobao example shows that, despite the high failure rate identified, AI applications may nevertheless greatly improve performance and generate significant economic value when they are coordinated with other resources and capabilities from a systemic perspective (Rayome, 2019) [32]. Managers must recognise the roles and contributions of other AI-related resources, including as data, current IT, and human resources, in addition to the technology itself. To give powerful AI for business management and symbiosis capabilities, it is crucial to organise these resources so they cooperate. The report claims that while AI technology is necessary, it is not sufficient to fully realise the business potential that this technology offers. In order to guarantee the success of AI applications, it is frequently necessary to change current resources and acquire new ones. The resources and information on AI for business management that were discovered in this study serve as a helpful foundation for organising and managing AI applications for effective business integration.

The second benefit of our concept is that it offers a helpful divide-and-conquer strategy to deal with the ostensibly challenging task of incorporating AI technology into a corporation. Prior to using this strategy, it is necessary to identify the crucial business processes that are candidates for AI automation, augmentation, or transformation. The case study's conclusions offer some practical recommendations for controlling AI applications for business management in business settings. Despite the high failure rate observed, the case of Taobao demonstrates that AI applications, when coordinated with other capabilities and resources from a systems perspective, can produce significant business value and greatly enhance performance (Rayome, 2019) [32]. Managers must recognise the roles and contributions of other AI-related resources for business

management, including as data, current IT, and human resources, in addition to the technology itself. It's crucial to organize these resources so they complement one another and provide powerful AI for business management and symbiotic capabilities. Instead of dispersing managerial efforts over all operations that may potentially benefit from AI enhancement, they were focused on enhancing these specific processes. Staff members were more enthusiastic and confident about integrating AI applications into additional business processes because early success was attained more quickly and visibly.

Third, Taobao's success shows that managing interactions and mutual talent development between AI and humans is necessary for integrating AI applications into organizations for business management. Collaborations between humans and machines are inevitable as AI applications multiply. Managers must be aware of and comprehend the nature of these partnerships in order to plan effectively, as their establishment can be resource and time intensive. The design of AI applications for business management should take organizational structure and work processes into account in addition to the technology itself as an artifact. The plan should take future developments of complex adaptive systems, such as humans and AI, into consideration. To achieve this, a greater respect for human agency and AI-human interfaces that encourage mutual learning for a longer-lasting partnership must exist instead of an excessive reliance on immediate effectiveness and financial gains.

6.3 Limitations and ideas for additional research

Limitations of study must be considered when analyzing the results because they suggest new lines of inquiry. First off, the results of the case study in this paper are less statistically generalizable than those from other approaches, such as surveys. When AI technologies for business management are used more generally, future study may gather data from new companies and other sectors in order to generalise the results to a population. Future survey polls may leverage the AI-related resources and abilities for business management outlined in this research as an empirical basis for selecting the topics to emphasize. The statistical and theoretical generalizability of studies that employ a variety of methods may be improved, and they may also deepen our understanding of the AI application phenomenon in business.

Second, while studying the e-commerce fulfilment centre, we failed to take into account other typical warehousing operations including product receiving, outbound logistics, and inventory auditing. We focused on the organisational processes for order selection, order packaging, and product storage instead. It was challenging to include AI applications in our investigation because Taobao hasn't yet incorporated them into other activities. The study is constrained because not all storage actions are covered, even in the event that there is a single instance of success that provides early and helpful information. To completely understand all of the advantages of AI in e-commerce fulfilment centres, more investigation into various warehousing approaches is required.

Thirdly, this research only includes the resources and capabilities that are found within an organization as a result of the resource orchestration technique that was employed. External variables like technological advancement were not formally incorporated into the framework, despite the fact that they were included in our research to the extent that they affected the availability of resources and the level of competence. This restriction opens the door to further study that would widen our paradigm by focusing on the influence of social perceptions, economic situations, and governmental laws on the implementation of AI applications for business management into organizations. To provide a more thorough understanding of the problem, such macro-level research may be used in conjunction with micro-level studies like those covered in this paper.

7. Conclusion

AI for business management will transform companies in a range of industries and open up possibilities that were previously unimaginable. Understanding the technology and integrating it with the many organisational components for business is that it must function with are essential if AI is to reach its full potential. We demonstrate numerous resources and abilities linked to AI, as well as their relationships and co-evolution, by providing a case study of productive AI applications by managing business. They are grouped into a framework that, from the perspective of resource orchestration, provides a detailed way for integrating AI applications into enterprises for business management. By stopping companies from allocating resources to unnecessary projects or attempting to manage too many activities at once in business, using a comprehensive strategy can help organizations stay on track and save money. It also acts as a reminder to managers to make the most of the technology and resources that are currently available, such as by combining the creativity of human employees

with AI's learning skills. Instead of just implementing AI for business management at the company, managers should think about how to design AI and the organization to create the X factor that will increase productivity by automating and modernizing business processes and improve relationships with customers by changing procedures for business management.

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