

Individual Capabilities and Corporate Human Capital in the Context of Human-AI Collaboration

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Abstract: There are lots of limitations to the traditional human capital management framework, such as lack of diversification of the competency structure of human talent, low rate of knowledge conversion, and lack of exploitation of the value of human capital. It thus becomes hard for organizations to fulfill the requirement of the quality development of organizations in the age of intelligent transformation. This paper adopts the human-AI collaboration theory and builds an analysis framework of "human-AI collaboration", "competency improvement of individual" and "corporate human capital value appreciation". Human-AI collaboration process mechanism is elaborated in this paper in three dimensions, which consist of individual competency transformation, human capital value reform and collaborative development. Furthermore, some cases in manufacturing, finance, Internet, health care industries have been selected in this paper. Comparative analysis on individual competency and corporate human capital value transformation before and after human-AI collaboration is done through case statistics analysis, composite index evaluation, etc. From the study, it was found out that in the financial industry, by applying the human-AI collaboration, the time needed for the assessment of one loan application has been decreased from 3 days to 0.8 days, the client base of one relationship manager has increased from 120 to 210, and the proportion of data analysis training has increased from 18% to 57%.

1. Introduction

With the further development of technologies such as artificial intelligence, big data, and cloud computing, basic transformations that affect the process of production and operations of enterprises as well as management and value creation have taken place. Artificial intelligence has ceased to be just a technological instrument but has become an important participant in the process of making decisions, creating knowledge, and business operation; therefore, the collaboration of man and AI has become one of the main methods for achieving digital transformation and high-quality development of enterprises. Under these conditions, the structure of individual abilities has been transformed into a combination of digital, human-machine collaboration, and innovation skills[1].

Based on the above considerations, this paper adopts the method of human-AI collaboration in

order to examine the relationship between individual capability and organizational human capital. First of all, this paper examines the transforming nature of individual capability through the method of human-AI collaboration, which includes the reasons behind the reconstruction of capability framework, the formation of capabilities of human-machine collaboration, and the strengthening of innovative decision-making capabilities. Second of all, this paper analyzes the ways in which the organizational human capital is reevaluated through the method of human-AI collaboration, which involves the changes in the structure of human capital as well as ways of increasing the value of human capital.

2. Related Work

As a consequence of quick developments in the field of artificial intelligence, human-robot collaboration is gradually becoming a research area in intelligent manufacturing, health care, education, and intelligent decision-making. To solve the issue of uncertainty during human-robot collaboration in intelligent manufacturing, Zheng et al. have suggested the notion of "collaborative intelligence" (CI), which is a mixture of human intelligence and artificial intelligence. Feasibility of the notion has been confirmed by an experiment concerning assembly tasks, and it has been found out that collaborative intelligence makes human-machine collaboration more flexible, adaptable, and efficient [2]. Ren et al. made a survey of the existing literature concerning intelligent machines and the evolution from intelligent machines to human-machine integrated intelligence in terms of systems implementation, integration mechanism, and interaction in collaborative decision-making [3]. As for the discussion of paradigms like "human-in-the-loop" and cognitive computing, Dave et al. considered their role in relation to data processing, decision making, and decision support, providing the application of blood glucose monitoring as an illustration of functioning of those paradigms with the help of McKinsey 4D framework. In addition, new models were described, including hybrid augmented intelligence, and the role of augmented intelligence was presented in terms of innovations in the field of decision making, optimization of decisions and cooperation between people and machines, especially concerning healthcare [4]. The work of Järvelä et al. paid attention to the way of socially shared regulation in human-AI interaction in learning process. The term "triggers" was introduced, and human-AI shared regulation in learning model was offered. Consequently, the findings of the research indicate that the collaboration based on hybrid intelligence is more effective in regard to the regulation of learning process [5]. In consideration of the study of the cross-cultural dilemmas in terms of the cooperation of AI with human intelligence in international humanitarian logistics, Chin et al. introduced a perspective of Yin-Yang dialectic analysis of AI-HI decision-making. It is found out that the results obtained in this study reveal that this perspective increases the cooperation of human intelligence and artificial intelligence in a cross-cultural environment, hence increasing efficiency and flexibility in the decision-making process for international humanitarian logistics [6]. Literature confirms the importance of the collaboration between humans and AI in various spheres – intelligent manufacturing, healthcare, innovation in education, cross-cultural decision-making, among others, gradually forming theoretical perspectives of collaboration – collaborative intelligence, augmented intelligence, and hybrid intelligence. However, current research focuses primarily on the application of human-AI collaboration in different sectors; the analysis of the evolution of individual abilities, the increase in the value of human capital, and the synergy of development of the two in human-AI collaboration remains rather unexplored. It is within this background that this paper examines the mechanisms and ways of human-AI collaboration in terms of the synergy of the development of individual abilities and corporate human capital.

3. Method

3.1 Characteristics of the Transformation of Individual Capabilities under Human-AI Collaboration

3.1.1 Interplay between Capability Development and Capital Accumulation

Regarding the relationship between humans and artificial intelligence, there is a growing link between the development of individual capabilities and the build-up of corporate human capital. Individual capabilities serve as the starting point for human capital creation and valuation, and corporate human capital build-up will serve as the necessary tool for the development of the employees. Together, they complement each other to form a virtuous cycle of cooperation.

To begin with, businesses have to develop a talent development program which is capable-oriented, such as digital capability, data analysis capability, capability of human-machine coordination and innovation capability and so forth. For example, in terms of the manufacturing industry, the workers in the smart factory not only have to know how to fix the machines by applying conventional techniques, but also have the capability to operate on industrial internet platform and analyze the operation data of the equipment and intelligent diagnostic system. The workers can quickly enhance the capability of predictive maintenance and become more productive through digital learning platform and virtual simulation system. Also, in terms of the financial industry, the relationship managers in the bank have to do the business using the intelligent risk management system and customer profile model; therefore, they have to develop the capability of data interpretation and risk recognition as well.

However, there is possibility in using the AI technology in capability development. Organizations can make use of smart assessment software that will help them to evaluate capabilities and diagnose the deficiencies, and develop customized development programs accordingly. For instance, in internet organizations, organizations can make use of smart learning software that will help them recommend customized courses and projects depending on the requirements of the job, and thereby develop capabilities in the field. With the process of learning and developing skill sets, capability develops, while at the same time human capital stock grows.

3.1.2 Development of Human-Machine Collaborative Capabilities

For the ecosystem that combines humans and machines working together, personal skill development not only includes task performance but also emphasizes teamwork within the human and machine ecosystem. The ability for human-machine teamwork is largely determined by the knowledge and usage of intelligent tools, which means using artificial intelligence wisely in connection with certain tasks.

Efficient teamwork in relation to both humans and AI requires that people have the capacity to utilize intelligent tools, analyze data, and manage collaboration. First, having the capacity to utilize intelligent tools means being able to understand how AI platforms operate and generate quality outputs through proper prompts. Second, having the capacity to analyze data is all about identifying, filtering, and validating AI data such that there would be no informational biases that will interfere with the process of working. Third, managing collaboration is about having the capacity to manage tasks, processes, and outputs from human-AI collaboration.

3.1.3 Enhancement of Innovation and Decision-Making Capabilities

The ability to innovate and take decisions is crucial in the development of individuals in the age of collaboration between human beings and artificial intelligence. The capability of artificial

intelligence to analyze data, make predictions, and develop solutions gives individuals enough information to serve as a basis for decision making, and in turn gives them the opportunity to engage in more innovative work. In addition, individuals will have an opportunity to go beyond their own experience and develop problems and solutions innovatively.

With regard to cooperation of man and artificial intelligence, the innovating capacity is firstly reflected through the innovating capability based on the integration of knowledge, scenario-based application, and value creation. Through the utilization of artificial intelligence for the integration of multi-source knowledge and its integration within the new framework of knowledge, man can make his innovation process better. Additionally, through data analysis and predictive simulation provided by artificial intelligence, the conditions for the verification of innovations will be more suitable.

With regard to decision making, despite the use of artificial intelligence to help people make data analysis and comparison between the choices, human experience, ethics, and value remain the key basis of making the decision. Specifically, in certain areas such as complex management, strategy planning, and risk control, humans still have the advantage of understanding context, social responsibility, and values. Therefore, when it comes to human-machine collaboration, humans will remain as important in decision making as before, but their science, preciseness, and foresight in decision making will be improved.

3.2 Value Reshaping of Corporate Human Capital through Human-AI Collaboration

3.2.1 Changes in the Composition of Human Capital

Considering the integration of humans and machines in such a way, the notion of human capital has been changed considerably within organizational settings. The conventional notion of human capital has placed much emphasis on the knowledge and experience that employees brought to an organization. However, considering the integration of artificial intelligence into organizational practices and administration, the notion of human capital is being expanded beyond the conventional boundaries of human resources, covering dimensions such as digitalization, intelligence, and collaboration.

First of all, digital literacy has turned into an indispensable part of human capital. In order to cope with demands of a digital work environment, individuals have not only to have enough specialist knowledge related to their sphere of activity, but also to be capable of collecting and processing data and using intelligent tools.

Secondly, the competence of human-machine collaboration turns out to be a criterion for the quality of human capital. People have to collaborate with artificial intelligence and exchange data with each other.

Thirdly, the role of innovations and learning grows increasingly important. Because of quick iterations and fast knowledge renewal, continuous learning becomes a necessary condition for the preservation of human capital value.

Thus, with human-AI collaboration, corporate human capital turns out to be a complex capital that includes professional, digital, innovative and collaborative competencies of people.

3.2.2 Human Capital Appreciation Mechanism

The environment where humans and artificial intelligence work together opens up new ways for increasing the value of human capital within organizations. Whereas the classic approaches to increasing the value of human capital are connected with education and acquiring experience, artificial intelligence allows for significantly increasing the effectiveness of gaining knowledge and

forming capabilities, thus increasing the value of human capital in a much shorter period.

Firstly, artificial intelligence allows for increasing the exchange of knowledge.

The intelligent knowledge bases, platforms, and decision support systems allow capturing and exchanging knowledge quickly without wasting resources associated with information silos; thus, the process of using knowledge becomes more efficient.

However, artificial intelligence will help enhance the effectiveness of the development of the capabilities of employees.

It becomes possible for organizations to use intelligent training tools, personalized learning, and analytical tools to effectively measure the skills gaps of employees and design customized development plans, thereby turning the talent development process into a data-driven process.

At the same time, the collaboration between people and machines will enhance the efficiency of work and creativity of enterprises.

Because most repetitive tasks will be handled by artificial intelligence, the employees will have more time to engage in value-added activities such as R&D, customer service, and decision making. Furthermore, because of the feedback systems of artificial intelligence, the employees will continually improve their approaches and gain experience.

3.2.3 Formation of Corporate Competitive Advantage

An increase in the value of human capital will sooner or later become recognized as an improvement in competitive advantage. As moving into the age of people and AI synergies, the nature of competitiveness in business has moved from being based on resource competitiveness, cost competitiveness to talent competitiveness and intelligence competitiveness. Human capital is an essential element in forming a competitive advantage for companies.

Firstly, the human-AI synergy results in increasing efficiency of the company. It helps allocate resources effectively, make fast decisions and reduce management costs as the highly qualified workforce is capable of innovatively designing and solving complicated tasks, which increases efficiency due to such cooperation. Secondly, the human-AI synergy generates innovation. Workers can use artificial intelligence to evaluate the market situation, create innovative products and achieve technology innovations much faster, thus gaining a competitive advantage in innovation.

Additionally, human-AI cooperation improves organizational resiliency and flexibility. In case of uncertainties associated with the volatility of the market, innovations in technology, and other possible external risks, the staff that is well-versed with digital technologies and can collaborate with each other will be able to quickly adjust their working patterns and resource allocation strategy, which will make the company more flexible. By means of combining human resources with artificial intelligence, companies gain a completely new form of competitive advantage by means of knowledge generation and intelligent decision making and innovations.

3.3 Pathways for the Synergistic Development of Individual Capabilities and Corporate Human Capital under Human-AI Collaboration

3.3.1 Interplay between Capability Development and Capital Accumulation

As to cooperation between humans and AI, the connection between capability building and human capital development has become increasingly obvious. The building of capabilities of people is a starting point for the creation and valuing of human capital, and, simultaneously, high-level human capital allows organizations to offer their employees an opportunity to improve themselves and make the process synergic.

First of all, companies should design a talent development program focused on building

capabilities which are digital literacy, data analytics abilities, human-AI collaboration capabilities, and innovation abilities of employees. It could be achieved through the use of such approaches as e-learning platforms, intelligent training programs, and projects. Second, companies should implement mechanisms of translating learning results into human capital value by linking capability building with promotion and pay raise.

However, artificial intelligence technology is a new way for companies to enhance their capability through innovation. Through intelligent capability assessment software, the company will be able to effectively monitor the capability of its workforce, detect any possible gaps in the skills, and design a personal development plan for each of the individuals. This will lead to the continuous acquisition of knowledge and skills among the employees resulting in improved professional capability and enhanced human capital.

3.3.2 Organizational Empowerment and Value Co-creation

Under conditions of symbiosis in the ecosystem between humans and advanced AI technologies, the roles of corporate organizations will no longer be limited to the management and control of employees, but rather the integration of resources and empowerment of capabilities. Corporations will not only be business platforms, but also the means to empower capability and generate values. Under conditions of intelligent organization ecosystem which is open and collaborative, corporations are able to make full use of the capabilities of employees and achieve human-AI collaboration and innovation.

On one hand, it is necessary for corporations to upgrade their digital platform by building a unified platform for data, knowledge and intelligence management in order to enable information access, knowledge sharing and collaboration among the employees. For instance, hospitals in the healthcare sector have used intelligent diagnostic platforms to integrate patient's medical records, medical imaging and clinical knowledge bases; thus the doctors are enabled to obtain assistance in diagnosis more efficiently and accurately. On the other hand, scientists and innovators in the sector of research and development can utilize generative AI technology to conduct literature review, experiment design and technical solution optimization.

As regards to the interaction between human and AI model, it implies that the value creation process is not based anymore on an individual's efforts but happens due to the cooperation of people in the organization, the firm itself, and AI. To put it into context, within the e-commerce sector, AI is responsible for understanding the customer's demands and providing products' recommendations, while the operation department handles the marketing and communication process, whereas the company manages the logistics data and sells more and creates more value for the customer.

3.3.3 Human Capital Optimization Strategies

In order to leverage the strength of human-AI collaboration, it is important that the firms need to constantly refine their talent configuration for maximum efficiency.

(1) The process of recruiting and developing the talents needs improvement.

Taking the example of the new energy vehicles industry, the firms that recruit talents would not depend upon the expertise in the area of technical fields like electrical engineering and mechanical manufacturing anymore; rather they would increasingly try to recruit those talents that are able to use data analysis and Artificial Intelligence in a bid to create innovation through recruitment of multifaceted talents.

(2) There should be an evaluation mechanism designed for the partnership of humans and AI.

For instance, in the customer service sector, the traditional evaluation mechanisms focus largely on the number of questions resolved and time spent on this. In the human-AI partnership framework,

the intelligent customer services handle the normal questions and answers, whereas the human partners handle the difficult issues and create relationships with the customers.

(3) The incentive systems and safeguard mechanisms should be made better.

In logistics, the companies would employ smart dispatch algorithms for improving the routing and setting up the incentives linked with data contribution, innovation, and quality of services. In this manner, the employees would be encouraged to take part in the process of digitalization. Moreover, the companies should make sure that there is greater transparency in the algorithms, greater security of the data, and greater safeguarding of the employees' rights. It would prevent the ethical problems created by the use of technology.

4. Statistical Case Analysis of the Impact of Human-AI Collaboration on Individual Capabilities and Corporate Human Capital

4.1 Sample Sources

To enhance the generalizability of the research findings, this study selects four sectors in which the use of AI is high, such as manufacturing, finance, internet, and healthcare industries. In addition, this paper focuses on eight organizations which have the features of typical cooperation between humans and AI. Specifically, in the manufacturing industry, the study focuses on smart manufacturing firms that engage in developing smart factories and industrial internet technologies; in the finance sector, commercial banks using the technologies of intelligent risk management, AI-based customer services, and big data decision-making systems; in the internet industry, platform companies that utilize AI algorithms in their operations and innovations; and in the healthcare industry, "smart hospitals" that have smart medical platforms and intelligent diagnosis and treatment systems. On the basis of the data gathered from 2021 to 2025, including annual reports of corporations and industry white papers, this study will conduct the comparison of the development of capabilities and human capital appreciation of individuals and organizations prior to and following the cooperation between humans and AI.

4.2 Analysis of Individual Capability Enhancement through Human-AI Collaboration

(1) Case Study: Manufacturing Industry

Taking a smart factory as an example, the introduction of industrial AI systems leads to the following changes:

Equipment inspection shifts from reliance on manual experience to data-assisted diagnosis;

Employees are required to master equipment status analysis skills;

Fault handling transitions from reactive repair to predictive maintenance.

Table 1. Statistical results for the manufacturing sector

Indicator	Before Implementation	After Implementation
Average Fault Diagnosis Time	45 min	18 min
Training Frequency	2 times/year	6 times/year
Digital Skills Coverage Rate	35%	82%

It is clear from Table 1 given below that the collaboration between humans and AI has led to significant advancements in relation to the efficiency of operation processes and the competency level of the employees of the manufacturing firms. More precisely, the mean time required for detecting failures in the equipment has been decreased from 45 minutes to 18 minutes, while the rate of digital skill acquisition has been raised from 35% to 82% and the number of training has become six times per year. In such a way, it may be stated that the introduction of intelligent

technologies has helped to develop digital competencies of the employees and maintain equipment properly.

(2) Case Study: Financial Industry

Following the launch of the intelligent risk control system:

Relationship managers shifted their focus from document review to risk assessment;

There was a marked increase in the demand for data analysis capabilities.

Table 2. Financial Industry Statistics

Indicator	Before Implementation	After Implementation
Loan Approval Time per Application	3 days	0.8 days
Number of Clients Served per Relationship Manager	120	210
Proportion of Data Analytics Training	18%	57%

Taking into account the information provided in Table 2, it is possible to state about the positive changes associated with the improvement of business effectiveness and digital skills of the employees of the financial industry because of the implementation of human intelligence together with artificial intelligence. Specifically, it took just 0.8 days to review a loan instead of three days; the amount of customers served by account managers grew from 120 to 210, and the percentage of employees' training related to data analysis increased from 18% to 57%. This shows that technologies of artificial intelligence made a valuable contribution to the improvement of efficiency of credit and customer services, as well as employees' skills of data analysis.

4.3 Analysis of Human-AI Collaboration for Enterprise Human Capital Appreciation

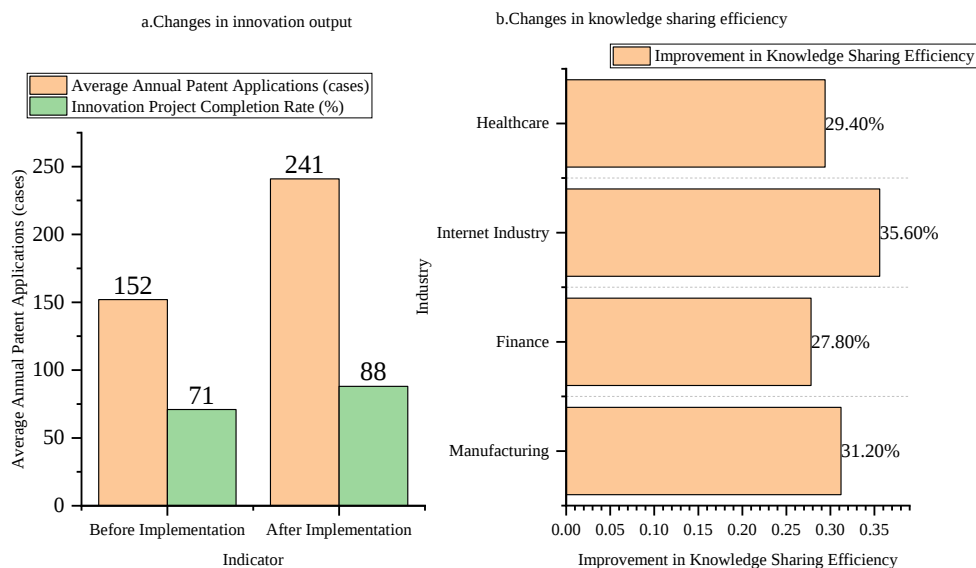


Figure 1. Changes in enterprise knowledge sharing efficiency and innovation output under the background of human-intelligence collaboration

From Figures 1a and 1b, one can see that not only does the cooperation between humans and AI ensure the efficiency of internal knowledge sharing, but it also greatly boosts the efficiency of innovation creation process. As shown in figure 1b, based on the statistical analysis results, the efficiency of knowledge-sharing has greatly risen in all sectors after the implementation of knowledge management platform; the maximum efficiency rise was achieved in the internet sector

– 35.6%; efficiency rises in manufacturing, healthcare, and finance were 31.2%, 29.4%, and 27.8% respectively.

This proves that the use of data platforms and knowledge management systems powered by AI are successful in keeping the knowledge, sharing of experience, and cooperation within departments which consequently leads to the improvement of the efficiency of knowledge resource usage by the corporation. In addition, there is a clear positive tendency of innovation productivity of the corporation as can be seen in Figure 1a: the average number of patent application per year has grown from 152 to 241 (an increase of 58.6%), and efficiency of innovation project implementation has grown from 71% to 88% (an increase of 17%). Hence, it could be concluded that the cooperation of man and machine improves the allocation of innovation resources due to intelligent analysis and decision-making.

5. Conclusion

The emergence of AI technologies embedded into business processes in corporate production and corporate management makes the synergy of human activities and artificial intelligence an important paradigm for creating conditions for high corporate development. On the grounds of the theory of synergy of individual competencies and human capital development, the present paper conducts the analysis of the transformation of individual competencies, the mechanisms of reconfiguration and creation of synergies under the conditions of human-AI interaction, as well as the statistical analysis of the cases in manufacturing, finance, internet, and healthcare sectors. As the analysis is based mostly on the statistics of cases from certain industries, the scope of research samples and data used is quite narrow and does not disclose the mechanisms of human-AI interaction influence on the transformation of individual competencies and human capital formation.

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