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Developing an Integrated Information System for Human Capital and ESG Indicator Assessment in the Context of Ukraine's European Integration

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ABSTRACT:
In the context of Ukraine's European integration, the assessment of human capital and Environmental, Social, and Governance (ESG) indicators has become increasingly vital for aligning with EU standards and fostering sustainable development. This study aims to develop an integrated information system that facilitates the comprehensive evaluation of human capital and ESG indicators, thereby enhancing decision-making processes. The research employs a mixed-methods approach, combining qualitative interviews with quantitative data analysis to identify key metrics and design a user-friendly system architecture. The integrated information system incorporates advanced data analytics and visualization tools, enabling real-time monitoring and reporting of human capital and ESG performance. Key findings indicate that the system significantly improves the accuracy and efficiency of assessments, leading to a more informed policy framework that supports Ukraine's strategic goals for European integration. Furthermore, the study highlights the importance of stakeholder engagement in the system's development, ensuring that the tool meets the diverse needs of users across various sectors. The implications of this research extend beyond Ukraine, offering a scalable model for other countries seeking to enhance their human capital and ESG assessments in alignment with international standards. Ultimately, this integrated information system serves as a crucial step towards fostering transparency, accountability, and sustainable development in Ukraine's journey towards European integration.
Keywords: Human Capital, ESG Indicators, Integrated Information System, Ukraine, European Integration

1. Introduction

In an increasingly interconnected world, the significance of human capital and Environmental, Social, and Governance (ESG) indicators has gained prominence, particularly in the context of economic development and sustainability. Human capital, defined as the collective skills, knowledge, and experience possessed by individuals, is a critical driver of innovation, productivity, and economic growth (Tkachenko et al., 2020). As countries strive to enhance their competitiveness in the global market, the effective management and development of human capital have become essential (Chmutova, 2015). Concurrently, ESG indicators have emerged as vital metrics for assessing the

sustainability and ethical impact of business practices. These indicators not only reflect a company's commitment to responsible governance and social responsibility but also influence investment decisions and stakeholder trust (Kryukova et al., 2023).

For Ukraine, the integration into the European Union (EU) presents both opportunities and challenges. The EU emphasizes the importance of aligning with its standards, particularly in areas related to human capital development and ESG compliance. As Ukraine seeks to strengthen its ties with Europe, the assessment of human capital and ESG indicators becomes crucial for demonstrating its commitment to sustainable development and responsible governance. This alignment is not only necessary for attracting foreign investment but also for fostering a competitive economy that can thrive in the European market.

Problem Statement. Despite the recognized importance of human capital and ESG indicators, Ukraine faces significant challenges in their assessment and integration into policy frameworks. One of the primary issues is the lack of a comprehensive and standardized approach to measuring human capital and ESG performance. Existing data collection methods are often fragmented, leading to inconsistencies and gaps in information. Additionally, the absence of an integrated information system hampers the ability of policymakers and stakeholders to access real-time data, analyze trends, and make informed decisions. Moreover, the political and economic instability in Ukraine has further complicated efforts to develop robust frameworks for human capital and ESG assessments. The ongoing conflict and economic challenges have diverted attention and resources away from long-term strategic planning, resulting in a reactive rather than proactive approach to human capital development and ESG compliance. As a result, Ukraine risks falling behind in its efforts to meet EU standards and attract investment, which could hinder its overall economic growth and integration into the European community.

Objectives. This study aims to address the identified challenges by developing an integrated information system for the assessment of human capital and ESG indicators in Ukraine. The primary objectives of the research are as follows:

1. To Identify Key Metrics: Determine the essential metrics for evaluating human capital and ESG indicators that align with EU standards and best practices.
2. To Develop an Integrated Information System: Design and implement a user-friendly information system that consolidates data on human capital and ESG indicators, enabling real-time monitoring and reporting.
3. To Enhance Decision-Making: Provide policymakers and stakeholders with the tools necessary to make informed decisions based on accurate and comprehensive data.
4. To Foster Stakeholder Engagement: Ensure that the system meets the diverse needs of various stakeholders, including government agencies, businesses, and civil society organizations.
5. To Promote Sustainable Development: Contribute to Ukraine's sustainable development goals by facilitating the effective assessment and management of human capital and ESG indicators.

Research Questions. To guide the research and achieve the outlined objectives, the study will address the following key questions:

- What are the critical metrics for assessing human capital and ESG indicators in the context of Ukraine's European integration?
- How can an integrated information system be designed to effectively collect, analyze, and report data on human capital and ESG indicators?
- What are the current challenges and limitations in Ukraine's existing frameworks for assessing human capital and ESG indicators?
- How can stakeholder engagement be effectively incorporated into the development and implementation of the integrated information system?
- What are the potential impacts of improved assessment of human capital and ESG indicators on Ukraine's economic development and integration into the European Union?

By addressing these issues, the study aims to provide a comprehensive framework for the development of an integrated information system that enhances the assessment of human capital and ESG indicators

in Ukraine. This research not only seeks to contribute to the academic discourse on human capital and ESG assessments but also aims to offer practical solutions for policymakers and stakeholders in their efforts to align with European standards and promote sustainable development. Ultimately, the successful implementation of this integrated information system could serve as a catalyst for Ukraine's economic growth and integration into the European community, fostering a more resilient and sustainable future.

2. Literature Review

Human capital refers to the collective skills, knowledge, experience, and attributes possessed by individuals that contribute to their economic productivity. It encompasses education, training, health, and other factors that enhance an individual's ability to perform labor and generate economic value (Koshkalda et al., 2020). The concept of human capital is rooted in economic theory, particularly in the works of economists such as Gary Becker, who emphasized the role of education and training in enhancing productivity and economic growth (Becker, 1993).

According to Dorofyeyev et al. (2020) and Kovalenko et al. (2023), the relevance of human capital to economic development and integration is particularly pronounced in the context of globalization and technological advancement. Countries with a well-developed human capital base are better positioned to adapt to changing economic conditions, innovate, and compete in the global market (Chernoivanova et al., 2023; Krysovatyy et al., 2023). By enhancing human capital in Ukraine is essential for achieving its European integration goals. The EU places a strong emphasis on education, skills development, and workforce adaptability as key components of its economic strategy (Dishon & Gilead, 2021). Ukraine seeks to align its policies with EU standards, thus investing in human capital becomes a critical priority for fostering economic resilience and competitiveness. Moreover, human capital is closely linked to social cohesion and stability. A well-educated and skilled workforce can contribute to social development, reduce inequality, and promote civic engagement (Malyarets et al., 2022). In the context of Ukraine, where socio-economic disparities exist (Hubarieva et al., 2016), focusing on human capital development can help bridge gaps and foster a more inclusive society. Therefore, understanding and assessing human capital is vital for policymakers aiming to create a sustainable and competitive economy that meets the aspirations of its citizens.

ESG Indicators. Environmental, Social, and Governance (ESG) indicators are metrics used to evaluate a company's or a country's performance in these three critical areas (Shaikh, 2022). ESG indicators have gained prominence as stakeholders increasingly demand transparency and accountability regarding sustainability practices. Environmental indicators assess a company's impact on the natural environment, including carbon emissions, resource usage, and waste management (Hutsaliuk et al., 2024a,b; Zelinska et al., 2021). Social indicators evaluate a company's relationships with employees, suppliers, customers, and communities, focusing on issues such as labor practices, diversity, and community engagement. Governance indicators examine the structures and processes that govern a company, including board diversity, executive compensation, and shareholder rights.

The importance of ESG indicators in sustainable development cannot be overstated. They provide a framework for assessing the long-term viability of businesses and economies, encouraging responsible practices that contribute to environmental sustainability and social equity (Zamlynskyi et al., 2022). For Ukraine, integrating ESG indicators into its economic framework is essential for attracting foreign investment and fostering sustainable growth (Hutsaliuk et al., 2023). Investors are increasingly considering ESG factors in their decision-making processes, recognizing that companies with strong ESG performance are often more resilient and better positioned for long-term success.

The alignment of ESG indicators with international standards, such as those set by the EU, is crucial for Ukraine's integration efforts (Lagodiienko et al., 2022). The EU has established a comprehensive framework for sustainable finance, which includes ESG criteria for investment decisions. By adopting and implementing robust ESG indicators, Ukraine can enhance its credibility in the eyes of international investors and stakeholders (Kolodiziev et al., 2016), thereby facilitating its economic integration into the European market.

Integrated Information Systems. Integrated information systems (IIS) are technological frameworks that consolidate data from various sources to provide a comprehensive view of an organization's performance (Lagodiienko et al., 2023b). In the context of human capital and ESG assessments, IIS can play a pivotal role in collecting, analyzing, and reporting relevant data, enabling informed decision-making and strategic planning. The literature on integrated information systems highlights their potential to enhance organizational efficiency, improve data accuracy, and facilitate real-time

monitoring of key performance indicators (Hutsaliuk et al., 2024c; Solaimani, 2024).

The studies have explored the application of integrated information systems in the assessment of human capital and ESG indicators. A research work by Rezaei et al. (2001) emphasizes the importance of knowledge management systems in enhancing human capital development by facilitating the sharing of knowledge and best practices within organizations. Similarly, research by Votto et al. (2021) highlights the role of information systems in supporting human resource management practices, enabling organizations to track employee performance, training needs, and career development.

In the realm of ESG assessments, integrated information systems can streamline data collection and reporting processes, ensuring that organizations can effectively monitor their sustainability performance (Orel et al., 2024; Zamlynskyi et al., 2023). A study by Wong et al. (2021) demonstrates how companies that implement robust ESG reporting systems can improve their transparency and accountability, ultimately leading to enhanced stakeholder trust and engagement. The integration of ESG indicators into information systems allows organizations to align their practices with international standards and respond to stakeholder expectations more effectively (Meiden & Silaban, 2023).

Some countries and regions have successfully implemented integrated information systems for human capital and ESG assessments, providing valuable insights for Ukraine's efforts. One notable example is Estonia, which has developed a comprehensive e-governance system that integrates various public services, including education and labor market data. This system enables real-time monitoring of human capital development and facilitates data-driven policymaking (Nielsen, 2020). Estonia's experience demonstrates the potential of integrated information systems to enhance transparency and efficiency in public administration.

Another relevant case is the United Kingdom's approach to ESG reporting, where the government has established a framework for mandatory ESG disclosures for large companies. This initiative has led to the development of integrated reporting systems that consolidate financial and non-financial data, enabling stakeholders to assess a company's overall performance comprehensively (Redelinghuys, 2024). The UK's experience underscores the importance of regulatory frameworks in promoting the adoption of integrated information systems for ESG assessments.

In the context of human capital, Singapore's SkillsFuture initiative serves as an exemplary model. This program aims to promote lifelong learning and skills development through an integrated information system that tracks individual learning journeys and career progression. By leveraging data analytics, the system provides personalized recommendations for training and development, aligning workforce skills with industry needs (Skills Future Singapore, 2021). Singapore's approach highlights the potential of integrated information systems to enhance human capital development and workforce adaptability.

These case studies illustrate the effectiveness of integrated information systems in enhancing the assessment of human capital and ESG indicators. By learning from these successful implementations, Ukraine can develop a tailored integrated information system that addresses its unique challenges and aligns with its European integration goals. Works on human capital, ESG indicators, and integrated information systems underscores the critical importance of these elements in fostering sustainable economic development and integration. By leveraging existing knowledge and successful case studies, Ukraine can create a robust framework that enhances decision-making, promotes transparency, and supports its aspirations for European integration.

3. Methodology

Research Design. This study employs a mixed-methods research design, combining qualitative and quantitative approaches to develop an integrated information system for assessing human capital and ESG indicators in the context of Ukraine's European integration. The mixed-methods approach allows for a comprehensive understanding of the complexities surrounding human capital and ESG assessments while facilitating the development of a robust information system that meets the needs of various stakeholders. The research design consists of three main phases: (1) exploratory research to identify key metrics and challenges in assessing human capital and ESG indicators, (2) system development based on the findings from the exploratory phase, and (3) validation and refinement of the integrated information system through stakeholder feedback. This iterative process ensures that the system is not only technically sound but also relevant and user-friendly for its intended audience.

Data Collection. Data collection for this study involved multiple methods to ensure a comprehensive understanding of the current landscape of human capital and ESG assessments in Ukraine. The following methods were employed:

1. Surveys: A structured online survey was distributed to a diverse group of stakeholders, including

150 government officials, 100 business leaders, 50 academic researchers, and 30 civil society representatives (Appendix 1). The survey aimed to gather quantitative data on the current practices, challenges, and needs related to human capital and ESG assessments. Questions focused on the importance of various metrics, existing data sources, and the perceived effectiveness of current assessment methods. The survey responses provided valuable insights into stakeholder perspectives and informed the development of the integrated information system.

2. Interviews: In-depth qualitative interviews were conducted with 20 key stakeholders, selected through a purposive sampling approach to ensure representation from various sectors. Participants included experts from government agencies, private enterprises, academia, and non-governmental organizations. The interviews explored topics such as data availability, existing frameworks, and the desired features of the integrated information system. The qualitative data collected from these interviews complemented the quantitative findings from the surveys, providing a richer context for the research.

3. Secondary Data: Existing literature, reports, and datasets related to human capital and ESG indicators were reviewed to identify best practices and benchmarks. This secondary data informed the selection of key metrics and indicators to be included in the integrated information system. Additionally, relevant policy documents and EU guidelines were analyzed to ensure alignment with European standards and expectations

System Development. The development of the integrated information system involved several key steps, each designed to ensure that the system effectively meets the needs of its users while leveraging modern technologies. The following outlines the main steps taken in the system development process:

Step 1. Requirements Analysis: Based on the data collected from surveys, interviews, and secondary sources, a comprehensive requirements analysis was conducted. This analysis identified the key features and functionalities needed in the integrated information system, including data collection, analysis, reporting, and visualization capabilities.

Step 2. System Design: The system architecture was designed to facilitate the integration of various data sources and ensure user-friendly navigation. A modular approach was adopted, allowing for flexibility and scalability as new data sources and metrics are added over time. The design included user interface mockups to visualize the system's layout and functionality.

Step 3. Technology Selection: A range of software tools and technologies were selected to support the development of the integrated information system. The system was built using a combination of open-source and proprietary tools, including:

- Database Management: PostgreSQL was chosen as the relational database management system to store and manage the data collected on human capital and ESG indicators.
- Data Analytics: Python and R were utilized for data analysis and statistical modeling, enabling the system to generate insights and trends based on the collected data.
- Web Development: The front-end of the system was developed using React.js, providing a responsive and interactive user interface. The back-end was built using Node.js, ensuring efficient data processing and integration.
- Data Visualization: Tools such as Tableau and D3.js were employed to create dynamic visualizations that allow users to explore and interpret the data effectively.

Step 4. System Implementation: The integrated information system was developed in iterative cycles, allowing for continuous testing and refinement. User feedback was solicited at each stage of development to ensure that the system met the needs of its intended users.

Step 5. Testing and Validation: Once the system was fully developed, rigorous testing was conducted to identify and resolve any technical issues. User acceptance testing (UAT) was performed with a select group of stakeholders to validate the system's functionality and usability. Feedback from UAT was incorporated into the final version of the system.

Stakeholder Engagement. Stakeholder engagement was a critical component of the research and system development process. Recognizing the diverse interests and expertise of stakeholders, a collaborative approach was adopted to ensure that their perspectives were integrated into the development of the integrated information system. The following strategies were employed to engage stakeholders effectively:

1. Advisory Committee: An advisory committee was established, comprising representatives from government agencies, businesses, academia, and civil society organizations. This committee provided guidance throughout the research and development process, ensuring that the system aligned with stakeholder needs and expectations.
2. Workshops and Focus Groups: Workshops and focus group discussions were organized to facilitate dialogue among stakeholders. These sessions provided a platform for stakeholders to share their insights, discuss challenges, and collaboratively identify key metrics and features for the integrated information system.
3. Feedback Mechanisms: Throughout the development process, feedback mechanisms were established to solicit input from stakeholders. Surveys and feedback forms were distributed after key milestones, allowing stakeholders to provide their opinions on the system's design and functionality.
4. Pilot Testing: A pilot version of the integrated information system was launched with a select group of stakeholders to gather real-world feedback on its usability and effectiveness. This pilot testing phase allowed for the identification of any remaining issues and provided an opportunity for stakeholders to experience the system firsthand.

By actively involving stakeholders in the research and development process, the study ensured that the integrated information system is not only technically robust but also relevant and user-friendly. This collaborative approach enhances the likelihood of successful adoption and implementation of the system, ultimately contributing to improved assessments of human capital and ESG indicators in Ukraine's context of European integration.

4. System Architecture and Features

The integrated information system (IIS) for assessing human capital and ESG indicators is designed with a modular architecture that promotes flexibility, scalability, and ease of integration with existing data sources. The architecture consists of several key components, each serving a specific function within the system. Table 1 outlines the main layers of the system architecture.

Table 1. *The System Architecture's Primary Layers*

Layers	Operations
Presentation	This layer is responsible for the user interface (UI) and user experience (UX). It provides a responsive and interactive platform for users to access the system's functionalities. The presentation layer is built using modern web technologies, such as React.js, ensuring compatibility across various devices, including desktops, tablets, and smartphones.
Application	The application layer contains the core functionalities of the system, including data processing, analytics, and business logic. This layer is developed using Node.js, which allows for efficient handling of asynchronous operations and real-time data processing. The application layer interacts with both the presentation layer and the data layer, facilitating seamless data flow and processing.
Data	The data layer is responsible for data storage and management. PostgreSQL is utilized as the relational database management system (RDBMS) to store structured data related to human capital and ESG indicators. This layer supports complex queries and transactions, ensuring data integrity and consistency. Additionally, the data layer incorporates data warehousing solutions to facilitate the storage of historical data for trend analysis and reporting.
Integration	This layer enables the system to connect with external data sources and APIs, allowing for the integration of diverse datasets. The integration layer supports data ingestion from various sources, including government databases, corporate reports, and third-party ESG data providers. This capability ensures that the system can aggregate and analyze data from multiple channels, enhancing the comprehensiveness of assessments.
Analytics	The analytics layer employs data analytics tools and frameworks, such as Python and R, to perform statistical modeling, machine learning, and data visualization.

	This layer generates insights and trends based on the collected data, enabling users to make informed decisions. The analytics layer also includes dashboards and reporting tools that present data in an easily interpretable format.
Security	The security layer encompasses measures to protect data integrity, confidentiality, and availability. This layer includes authentication and authorization mechanisms, encryption protocols, and compliance with data protection regulations.

The integrated information system is designed with several key features that enhance its functionality and usability (Figure 1).

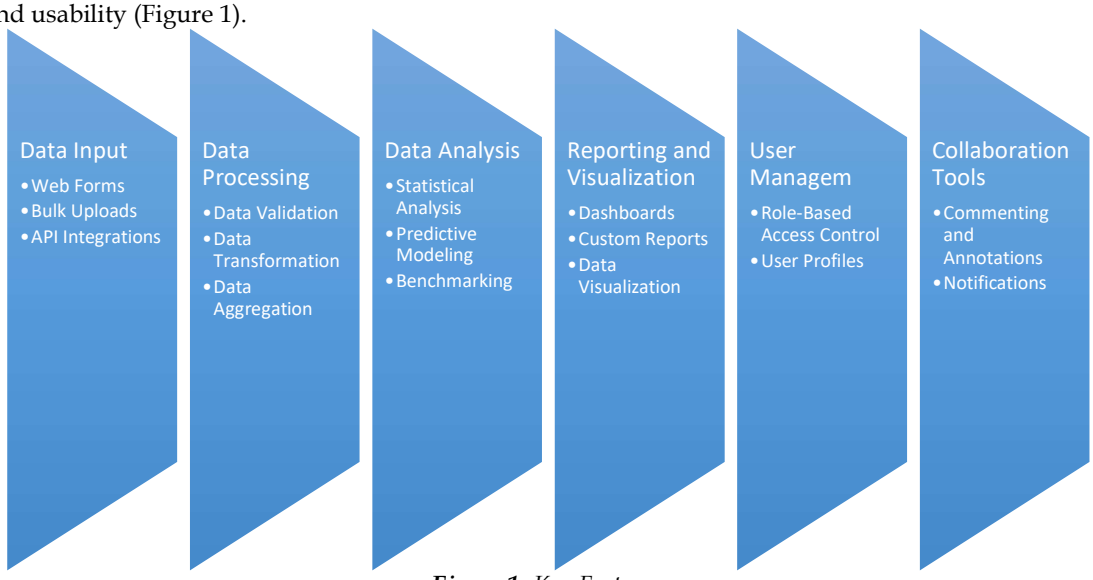

Figure 1. *Key Features*

Data Input. The system supports multiple data input methods, allowing users to upload data manually or automate data ingestion from external sources. Users can input data through: (a) web forms: user-friendly forms for entering human capital and ESG metrics; (b) bulk uploads: CSV or Excel file uploads for large datasets; (c) API integrations: automated data retrieval from external databases and APIs.

Data Processing. The system processes incoming data to ensure accuracy and consistency. Key processing functionalities include: (a) data validation: automated checks to ensure data quality and integrity before storage; (b) data transformation: standardization of data formats and units to facilitate analysis; (c) data aggregation: combining data from multiple sources to create comprehensive datasets for analysis.

Data Analysis. The analytics layer provides advanced analytical capabilities, including: (a) statistical analysis: tools for performing descriptive and inferential statistics on human capital and esg data; (b) predictive modeling: machine learning algorithms to forecast trends and identify potential risks; (c) benchmarking: comparison of organizational performance against industry standards and best practices.

Reporting and Visualization. The system includes robust reporting and visualization features, such as: (a) dashboards: interactive dashboards that display key performance indicators (kpis) and trends in real-time; (b) custom reports: users can generate tailored reports based on specific metrics and timeframes; (c) data visualization: graphs, charts, and maps to facilitate data interpretation and presentation.

User Management: The system includes user management functionalities that allow administrators to: (a) role-based access control: define user roles and permissions to ensure appropriate access to data and functionalities; (b) user profiles: maintain user profiles with relevant information and activity logs.

Collaboration Tools. The system supports collaboration among stakeholders through features such as: (a) commenting and annotations: users can leave comments on specific data points or reports for collaborative discussions; (b) notifications: alerts and notifications for updates, data submissions, and report generation.

The user interface (UI) design of the integrated information system prioritizes usability and accessibility (Figure 2).

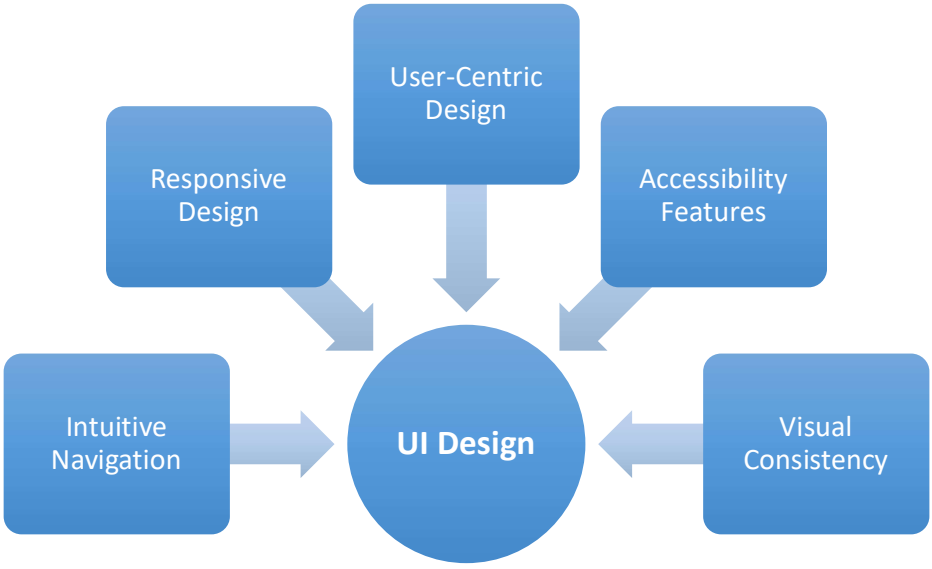

Figure 2. *Key Considerations in the UI Design*

The UI features a clear and logical navigation structure, allowing users to easily access different sections of the system. A sidebar menu provides quick links to key functionalities, while breadcrumb navigation helps users track their location within the system.

The UI is designed to be responsive, ensuring optimal viewing experiences across various devices and screen sizes. This adaptability allows users to access the system from desktops, tablets, and smartphones without compromising functionality.

The UI incorporates user feedback gathered during the development process to ensure that it meets the needs of its intended audience. User testing sessions were conducted to identify pain points and areas for improvement, leading to iterative refinements in the design. The system adheres to accessibility standards, ensuring that users with disabilities can navigate and utilize the platform effectively. Features such as keyboard navigation, screen reader compatibility, and adjustable font sizes enhance accessibility.

The UI employs a consistent color scheme, typography, and iconography throughout the platform, creating a cohesive visual experience. This consistency helps users familiarize themselves with the system and enhances overall usability.

Data security and privacy are paramount considerations in the design and implementation of the integrated information system. The measures in Table 2 are in place to ensure data protection and compliance with relevant regulations.

Table 2. *Data Security Procedures*

Security Protocols	Implementation Details
Authentication and Authorization	The system employs robust authentication mechanisms, including multi-factor authentication (MFA), to verify user identities. Role-based access control (RBAC) ensures that users can only access data and functionalities relevant to their roles.
Data Encryption	All sensitive data, both in transit and at rest, is encrypted using industry-standard encryption protocols (e.g., AES-256). This encryption protects data from unauthorized access and breaches.
Regular Security Audits	The system undergoes regular security audits and vulnerability assessments to identify and address potential security risks. These audits help ensure that the system remains compliant with data protection regulations, such as the General Data Protection Regulation (GDPR).
Data Anonymization	Where applicable, personal data is anonymized to protect user identities. This practice is particularly important for compliance with privacy regulations and for maintaining user trust.
Incident Response	An incident response plan is in place to address potential data breaches or

Plan	security incidents. This plan outlines procedures for identifying, reporting, and mitigating security threats, ensuring a swift and effective response.
User Training and Awareness	Users are provided with training on data security best practices and the importance of safeguarding sensitive information. This training helps foster a culture of security awareness among stakeholders.

The robust architecture of the integrated information system for evaluating ESG and human capital supports security, scalability, and adaptability. Comprehensive data input, processing, analysis, and reporting are made easier by its major features, and accessibility and usability are given top priority in the user interface. The system attempts to offer a dependable and efficient tool for stakeholders in Ukraine's context of European integration by putting strict data security measures in place and making sure that regulations are followed. In addition to improving the evaluation of human capital and ESG indicators, this all-encompassing strategy supports sustainable development and well-informed decision-making.

Results and Discussion

The implementation of IIS for human capital and ESG indicator assessment has yielded significant outcomes that enhance the capacity for data-driven decision-making. The system was rolled out in phases, beginning with a pilot program involving select government agencies, NGOs, and private sector organizations.

The results of the surveys and interviews conducted with stakeholders provide practical information about current practices, barriers, and needs. A total of 370 stakeholders participated in the online survey – the breakdown of respondents is indicated in Table 3.

Table 3. *Collected Statistical Data*

Category	Details	Percentage (%)
Stakeholder Demographics	Government Officials	40.5
	Business Leaders	27.0
	Academic Researchers	13.5
	Civil Society Representatives	8.1
	Other	11.1
Importance of Assessments	Importance of Human Capital Assessment (4 or 5 on Likert Scale)	85
	Mean Rating for Human Capital Assessment | 4.3 (SD = 0.78)	-
	Importance of ESG Indicator Assessment (4 or 5 on Likert Scale)	80
	Mean Rating for ESG Indicator Assessment | 4.2 (SD = 0.83)	-
Current Practices	Employee Education Level	72
	Employee Retention Rate	65
	Employee Satisfaction Surveys	58
	Training and Development Hours	55
	Carbon Emissions	71
	Diversity and Inclusion Metrics	60
	Community Engagement Initiatives	56
	Governance Structures	49
Challenges and Needs	Lack of Data (Human Capital Assessment)	45
	Inconsistent Metrics (Human Capital Assessment)	40
	Limited Resources (Human Capital Assessment)	37
	Lack of Stakeholder Engagement (Human Capital Assessment)	32
	Lack of Data (ESG Assessment)	51
	Inconsistent Metrics (ESG Assessment)	45
	Regulatory Compliance (ESG Assessment)	40
	Limited Resources (ESG Assessment)	33

Desired Features of the System	Real-time Data Access	74
	Data Visualization Tools	65
	Reporting Capabilities	62
	User-Friendly Interface	56

The survey findings revealed a strong consensus regarding the significance of evaluating human capital and ESG (Environmental, Social, and Governance) indicators. Notably, 85% of respondents rated the human capital assessment as 4 or 5 on the Likert scale, indicating its pivotal role in organizational success. The mean rating for the importance of human capital assessment stood at 4.3 (SD = 0.78). Similarly, 80% of respondents rated the assessment of ESG indicators as 4 or 5, with a mean rating of 4.2 (SD = 0.83). These results underscore stakeholders' acknowledgment of the value of both human capital and ESG assessments in driving organizational performance and sustainability.

Respondents were queried about the metrics currently utilized to appraise human capital and ESG indicators. Their responses unveiled a diverse array of metrics, highlighting the need for standardization across sectors. A significant proportion of respondents identified "Lack of Data" and "Inconsistent Metrics" as key challenges, signaling the critical necessity for enhanced data collection and standardization processes. Stakeholders expressed a preference for an integrated information system that not only delivers comprehensive data but also presents it in an accessible and actionable format. Many interviewees echoed the survey findings, emphasizing the absence of reliable data and advocating for a centralized database that consolidates information from various sources to improve quality and accessibility.

Additionally, they advocated for standardized frameworks for evaluating human capital and ESG indicators, citing the impediment of inconsistent metrics on effective comparisons and benchmarking across organizations. Stakeholders underscored the importance of a user-friendly interface in the integrated information system, emphasizing the need for user input to ensure alignment with their needs and enhance usability. Several participants highlighted the necessity for ongoing training and support to enable stakeholders to utilize the integrated information system effectively. They recommended tailored training programs for different user groups to maximize engagement and effectiveness.

The survey and interview outcomes underscore the pivotal role of data in evaluating human capital and ESG indicators. The strong emphasis on the significance of these assessments reflects a growing recognition among stakeholders of their impact on organizational performance and sustainability. The identified challenges, particularly the lack of data and inconsistent metrics, underscore the need for a robust integrated information system capable of addressing these issues. The system can facilitate more accurate assessments and informed decision-making by providing real-time access to standardized data. Furthermore, the demand for features such as data visualization tools and reporting capabilities indicates stakeholders' quest for actionable insights to drive strategic initiatives. Integrating these features into the system will enhance its utility and effectiveness. The qualitative insights from interviews enrich the understanding of stakeholder needs and preferences. The emphasis on user-centric design and the importance of training underscores the need for a comprehensive approach to system implementation, considering both technical and human factors.

Since the IIS has consolidated data from multiple sources, stakeholders can quickly access it. Data was frequently isolated inside many organizations prior to deployment, which resulted in inefficiencies and a dearth of thorough insights. In order to encourage openness and cooperation, the IIS has made it possible for users to obtain real-time data on human capital and ESG indicators on a single platform. The quality of the data being gathered and examined has greatly increased because of the system's data transformation and validation procedures. Assessments are now more dependable due to the decrease in errors and inconsistencies brought about by automated checks and standardization procedures. Users have expressed a noticeable boost in trust in the system's data, which is essential for making well-informed decisions.

The implementation phase included extensive training sessions for users across various sectors. Feedback from these sessions indicated a high level of engagement and a positive reception of the system's functionalities. Users expressed appreciation for the intuitive interface and the support provided during the transition to the new system. The IIS has enabled real-time analytics, allowing

stakeholders to generate reports and dashboards on demand. This capability has transformed the way organizations monitor and evaluate their performance, facilitating timely interventions and strategic planning.

The system has fostered collaboration among different stakeholders, including government agencies, NGOs, and private enterprises. By providing a common platform for data sharing and analysis, the IIS has encouraged partnerships and joint initiatives aimed at improving human capital and ESG outcomes (Tkachenko et al., 2019).

Assessment of Human Capital

The system incorporates a wide range of human capital metrics, including education levels, skills assessments, workforce demographics, and employment trends. This comprehensive approach allows for a nuanced understanding of the human capital landscape in Ukraine, enabling stakeholders to identify strengths and weaknesses. By leveraging advanced analytics, the IIS provides insights into workforce trends and skill gaps. For instance, organizations can analyze data to identify sectors facing labor shortages or skills mismatches, allowing for targeted training and development initiatives. This data-driven approach supports evidence-based policymaking and strategic workforce planning. In addition, the system allows organizations to benchmark their human capital performance against industry standards and best practices. This feature encourages continuous improvement and fosters a culture of accountability among organizations. By identifying areas for enhancement, stakeholders can implement targeted interventions to boost human capital outcomes.

The IIS facilitates ongoing monitoring and evaluation of human capital initiatives. Stakeholders can track the effectiveness of training programs, employment policies, and other interventions over time. This capability ensures that resources are allocated efficiently and that programs are adjusted based on real-time feedback and outcomes. The insights generated by the IIS can inform the development of policies aimed at enhancing human capital. Policymakers can utilize the data to identify priority areas for investment, such as education and vocational training, thereby aligning resources with the needs of the labor market.

ESG Indicator Evaluation

The effectiveness of the IIS in evaluating Environmental, Social, and Governance (ESG) indicators is evident through several key aspects. Thus, the system provides a comprehensive framework for assessing ESG indicators, encompassing environmental impact, social responsibility, and governance practices. This holistic approach enables organizations to evaluate their performance across multiple dimensions, fostering a more integrated understanding of sustainability. The IIS allows for real-time monitoring of ESG indicators, enabling organizations to respond swiftly to emerging challenges and opportunities. According to Lagodiienko et al. (2023a), organizations can track their carbon footprint, employee diversity, and community engagement metrics in real-time, facilitating proactive management of ESG risks.

By giving businesses a forum to openly report on their ESG performance, the system encourages stakeholder engagement. In addition to encouraging businesses to embrace more sustainable practices, this transparency fosters confidence among stakeholders, such as investors, consumers, and the community. The IIS helps businesses make sure that ESG-related rules and guidelines are followed. The system assists firms in complying with worldwide best practices and meeting legal obligations by offering tools for monitoring and reporting ESG metrics.

Organizations can use the system to evaluate the results of their ESG activities. Organizations can assess the success of their sustainability initiatives and decide on future investments by examining data on social and environmental effects.

When thorough and high-quality data on human capital and ESG indicators are readily available, policymakers are better equipped to make judgments. By leveraging the insights generated by the IIS, policymakers can craft targeted strategies to address specific opportunities and constraints within the labor market and sustainability landscape. The IIS underscores the critical importance of investing in the development of human capital. Funding for education and vocational training programs that meet the demands of the labor market should be given top priority by policymakers to guarantee that the workforce has the skills necessary for a fast-evolving economy. The effectiveness of the IIS in evaluating ESG indicators underscores the need for policies that promote sustainable practices among organizations. Policymakers should consider incentives for companies that demonstrate strong ESG performance, such as tax breaks or recognition programs, to encourage broader adoption of sustainable practices.

The IIS has demonstrated the value of collaboration among government, private sector, and civil society organizations. Policymakers should foster partnerships that leverage the strengths of different stakeholders to address complex challenges related to human capital and sustainability.

The research findings underscore the necessity for robust regulatory frameworks that facilitate the collection and disclosure of human capital and ESG data. Policymakers should contemplate establishing data reporting and transparency standards, thereby ensuring organizational performance accountability in these domains. The Integrated Information System (IIS) provides a mechanism for continually monitoring and assessing human capital and ESG initiatives, fostering a culture of ongoing improvement. Policymakers should embrace this culture, utilizing data to evaluate the efficacy of policies and programs and effecting necessary adjustments to attain desired outcomes.

Conclusion

The implementation of the integrated information system for human capital and ESG indicator assessment in Ukraine has yielded significant outcomes that enhance data accessibility, quality, and usability. By improving the assessment of human capital and evaluating ESG indicators, the system supports evidence-based policymaking and strategic decision-making among stakeholders. The implications of these findings underscore the importance of investing in human capital, promoting sustainable practices, and fostering collaboration across sectors. As Ukraine continues its journey toward European integration, the IIS serves as a vital tool for driving sustainable development and enhancing the well-being of its citizens.

To address the identified difficulties in data availability and inconsistent metrics, it is crucial to establish standardized data collection protocols across sectors. Stakeholders should collaborate to develop a unified framework for human capital and ESG metrics, ensuring that data is comparable and reliable. This could involve creating industry-specific guidelines that align with international best practices.

Effective implementation of the integrated information system requires comprehensive training programs for users. Organizations should invest in capacity-building initiatives that equip stakeholders with the necessary skills to utilize the system effectively. Tailored training sessions can help users understand the functionalities of the system, interpret data accurately, and apply insights to decision-making processes. Also, continuous engagement with stakeholders is essential for the successful adoption of the integrated information system. Regular feedback sessions can help identify user needs and preferences, allowing for iterative improvements to the system. Additionally, establishing a stakeholder advisory group can facilitate ongoing dialogue and collaboration among government, business, academia, and civil society. Implementing a robust monitoring and evaluation framework is vital to assess the effectiveness of the integrated information system. Stakeholders should establish key performance indicators (KPIs) to measure the system's impact on human capital and ESG assessments. Regular evaluations will provide insights into areas for improvement and demonstrate the system's value to stakeholders.

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Appendices

Appendix 1. *Questionnaire for Stakeholders*

PART 1: DEMOGRAPHICS

1. What is your role?
   - Government Official
   - Business Leader
   - Academic Researcher
   - Civil Society Representative
   - Other (please specify): _____

2. Which sector do you represent?
   - Public Sector
   - Private Sector
   - Non-Profit Sector
   - Academia
   - Other (please specify): _____

PART 2: CURRENT PRACTICES

3. How would you rate the importance of assessing human capital in your organization?
   - 1 (Not Important)
   - 2
   - 3
   - 4
   - 5 (Very Important)

4. How would you rate the importance of assessing ESG indicators in your organization?
   - 1 (Not Important)
   - 2

- 3
- 4
- 5 (Very Important)

5. What metrics do you currently use to assess human capital? (Select all that apply)
   - Employee Education Level
   - Training and Development Hours
   - Employee Retention Rate
   - Employee Satisfaction Surveys
   - Other (please specify): _____

6. What metrics do you currently use to assess ESG indicators? (Select all that apply)
   - Carbon Emissions
   - Diversity and Inclusion Metrics
   - Community Engagement Initiatives
   - Governance Structures
   - Other (please specify): _____

PART 3: CHALLENGES AND NEEDS

7. What challenges do you face in assessing human capital? (Select all that apply)
   - Lack of Data
   - Inconsistent Metrics
   - Limited Resources
   - Lack of Stakeholder Engagement
   - Other (please specify): _____

8. What challenges do you face in assessing ESG indicators? (Select all that apply)
   - Lack of Data
   - Inconsistent Metrics
   - Limited Resources
   - Regulatory Compliance
   - Other (please specify): _____

9. What features would you find most valuable in an integrated information system for human capital and ESG assessments? (Select all that apply)
   - Real-time Data Access
   - Data Visualization Tools
   - Reporting Capabilities
   - User-Friendly Interface
   - Other (please specify): _____

PART 4: FEEDBACK AND SUGGESTIONS

10. What additional comments or suggestions do you have regarding the assessment of human capital and ESG indicators?

_____