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Research Article

Building a Holistic Information System for Evaluating Human Capital and ESG Metrics in Support of Ukraine's European Integration

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ABSTRACT

As Ukraine advances towards European integration, the assessment of human capital and Environmental, Social, and Governance (ESG) indicators has become crucial for aligning with EU standards and fostering sustainable development. This study aims to develop an integrated information system that enables a comprehensive evaluation of human capital and ESG indicators, thereby enhancing decision-making processes. The research combines qualitative interviews with quantitative data analysis to identify essential metrics and create an intuitive system architecture. The proposed information system incorporates sophisticated data analytics and visualization tools, facilitating real-time monitoring and reporting of human capital and ESG performance. The results indicate that this system significantly improves the accuracy and efficiency of evaluations, leading to a more informed policy framework that supports Ukraine's strategic goals for European integration. The study emphasizes the importance of stakeholder involvement in the system's development to ensure it meets the diverse needs of users across various sectors. The findings of this research have broader implications, offering a scalable model for other countries looking to enhance their human capital and ESG assessments in line with international standards. This integrated information system is a crucial step towards fostering transparency, accountability, and sustainable development in Ukraine's journey towards European integration.

Keywords: *Management of Information Systems, Integrated Information System, Human Capital, System Implementation, ESG Indicators.*

INTRODUCTION

In today's interconnected world, the importance of human capital and Environmental, Social, and Governance (ESG) indicators has become increasingly evident, especially regarding economic development and sustainability. Human capital, which encompasses the collective skills, knowledge, and experiences of individuals, plays a vital role in driving innovation, productivity, and economic growth (Tkachenko et al., 2020). As nations work to enhance their competitiveness in the global marketplace, effectively managing and developing human capital has become essential (Chmutova, 2015). Simultaneously, ESG indicators have emerged as crucial metrics for evaluating the sustainability and ethical implications of business practices. These indicators not only demonstrate a company's commitment to responsible governance and social responsibility but also significantly influence investment decisions and stakeholder trust (Kryukova et al., 2023).

For Ukraine, the prospect of integration into the European Union (EU) presents both opportunities and challenges. The EU places a strong emphasis on aligning with its standards, particularly in areas related to human capital development and ESG compliance. As Ukraine seeks to strengthen its ties with Europe, assessing human capital and ESG indicators becomes vital for showcasing its commitment to sustainable development and responsible governance. This alignment is essential not only for attracting foreign investment but also for nurturing a competitive economy capable of thriving in the European market. Despite the acknowledged significance of human capital and ESG indicators, Ukraine encounters substantial challenges in their assessment and integration into policy frameworks. A primary issue is the lack of a comprehensive and standardized approach to measuring human capital and ESG performance. Current data collection methods are often fragmented, resulting in inconsistencies and gaps in information. Furthermore, the absence of an integrated information system hinders policymakers and stakeholders from accessing real-time data, analyzing trends, and making informed decisions. The ongoing political and economic instability in Ukraine has further complicated efforts to establish robust frameworks for human capital and ESG assessments. The persistent conflict and economic difficulties have diverted attention and resources away from long-term strategic planning, leading to a reactive rather than proactive approach to human capital development and ESG compliance. Consequently, Ukraine risks lagging in its efforts to meet EU standards and attract investment, which could impede its overall economic growth and integration into the European community.

This study aims to tackle the identified challenges by developing an integrated information system for assessing human capital and ESG indicators in Ukraine. The primary objectives of the research are (i) Determine the essential metrics for evaluating human capital and ESG indicators that align with EU standards and best practices; (ii) Design and implement a user-friendly information system that consolidates data on human capital and ESG indicators, enabling real-time monitoring and reporting; (iii) Equip policymakers and stakeholders with the necessary tools to make informed decisions based on accurate and comprehensive data, (iv) Ensure that the system addresses the diverse needs of various stakeholders, including government agencies, businesses, and civil society organizations; (v) Contribute to Ukraine's sustainable development goals by facilitating the effective assessment and management of human capital and ESG indicators.

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?

The successful implementation of this integrated information system could act as a catalyst for Ukraine's economic growth and integration into the European community, fostering a more resilient and sustainable future.

THEORETICAL FRAMEWORK

Human capital encompasses the collective skills, knowledge, experience, and attributes that individuals possess, which contribute to their economic productivity. This concept includes factors such as education, training, and health, all of which enhance an individual's capacity to perform labor and generate economic value (Koshkalda et al., 2020). The foundation of human capital theory is rooted in economic principles, particularly articulated by economists like Gary Becker, who highlighted the significance of education and training in boosting productivity and fostering economic growth (Becker, 1993). The relevance of human capital to economic development and integration is particularly pronounced in the context of globalization and technological advancement, as noted by Dorofyeyev et al. (2020) and Kovalenko et al. (2023). Countries that cultivate a robust human capital base are better equipped to adapt to evolving economic conditions, innovate, and compete effectively in the global marketplace (Chernoivanova et al., 2023; Krysovatyy et al., 2023). For Ukraine, enhancing human capital is crucial for achieving its European integration objectives. The EU prioritizes education, skills development, and workforce adaptability as essential components of its economic strategy (Dishon & Gilead, 2021). Therefore, aligning policies with EU standards necessitates significant investment in human capital to foster economic resilience and competitiveness. Moreover, human capital is intricately linked to social cohesion and stability. A well-educated and skilled workforce can drive social development, mitigate inequality, and encourage civic engagement (Malyarets et al., 2022). In Ukraine, where socio-economic disparities are prevalent (Hubarieva et al., 2016; Fabuš et al., 2019; Gamali et al., 2018), focusing on human capital development can help bridge these gaps and promote a more inclusive society. Consequently, understanding and assessing human capital is vital for policymakers aiming to create a sustainable and competitive economy that meets the aspirations of its citizens.

Environmental, Social, and Governance (ESG) indicators serve as metrics for evaluating a company's or a country's performance in these three critical areas (Shaikh, 2022). The significance of ESG indicators has grown as stakeholders increasingly demand transparency and accountability regarding sustainability practices (Shcherbak et al., 2020). Environmental indicators assess a company's impact on the natural environment, including aspects such as carbon emissions, resource usage, and waste management (Teslenko et al., 2019; Hutsaliuk et al., 2024a,b; Stepanenko et al., 2023; Zelinska et al., 2021; Zhovnovach et al., 2021). Social indicators focus on a company's relationships with employees, suppliers, customers, and communities, addressing issues like labor practices, diversity, and community engagement. Governance indicators evaluate the structures and processes that govern a company, including board diversity, executive compensation, and shareholder rights. The role of ESG indicators in sustainable development is critical. They provide a framework for assessing the long-term viability of businesses and economies, promoting 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 (Yermachenko et al., 2023), recognizing that companies with strong ESG performance are often more resilient and better positioned for long-term success.

Aligning ESG indicators with international standards, such as those established by the EU, is crucial for Ukraine's integration efforts (Lagodiienko et al., 2022; Yankovyi et al., 2020). The EU has developed a comprehensive framework for sustainable finance that includes ESG criteria for investment decisions. By adopting and implementing robust ESG indicators, Ukraine can enhance its credibility with international investors and stakeholders (Kolodiziev et al., 2016), thereby facilitating its economic integration into the European market.

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 assessing human capital and ESG indicators, IIS can play a crucial role in collecting, analyzing, and reporting relevant data, enabling informed decision-making and strategic planning. The literature on integrated information systems emphasizes their potential to enhance organizational efficiency, improve data accuracy, and facilitate real-time monitoring of key performance indicators (Hutsaliuk et al., 2024c; Kuchuk et al., 2023; Solaimani, 2024; Korchenko et al., 2021). Rezaei et al. (2001) highlight the importance of knowledge management systems in enhancing human capital development by facilitating the sharing of knowledge and best practices within organizations. Similarly, Votto et al. (2021) discuss how information systems support 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 effectively monitor their sustainability performance

(Milov et al., 2019; Orel et al., 2024; Levchenko et al., 2018; Zamlynskyi et al., 2023; Lysytsia et al., 2019). Wong et al. (2021) demonstrate that companies implementing robust ESG reporting systems can improve their transparency and accountability, ultimately leading to enhanced stakeholder trust and engagement. Integrating ESG indicators into information systems allows organizations to align their practices with international standards and respond more effectively to stakeholder expectations (Meiden & Silaban, 2023).

Several countries and regions have successfully implemented integrated information systems for human capital and ESG assessments, providing valuable insights for Ukraine's initiatives (Dmytryshyn et al., 2018). Estonia 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 illustrates 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, allowing 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 promotes 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 improving the assessment of human capital and ESG indicators.

METHODOLOGY

The research design is structured into three main phases:

i. **Exploratory Research:** This phase focuses on identifying key metrics and challenges related to the assessment of human capital and ESG indicators.
ii. **System Development:** Based on insights gained from the exploratory phase, this step involves the design and implementation of the integrated information system.
iii. **Validation and Refinement:** The final phase includes gathering stakeholder feedback to validate and refine the integrated information system. This iterative process ensures that the system is technically sound and user-friendly for its intended audience.

DATA COLLECTION

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 collect quantitative data on 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 responses provided valuable insights into stakeholder perspectives and informed the development of the integrated information system.

In-depth qualitative interviews were conducted with 20 key stakeholders selected through purposive sampling 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 desired features of the integrated information system. The qualitative data collected complemented the quantitative findings from the surveys, enriching the research context.

A review of existing literature, reports, and datasets related to human capital and ESG indicators was conducted 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

A comprehensive requirements analysis was conducted based on data collected from surveys, interviews, and secondary sources. This analysis identified essential features and functionalities needed in the integrated information system, including capabilities for data collection, analysis, reporting, and visualization.

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. User interface mockups were created to visualize the system's layout and functionality.

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

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

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. After 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.

A collaborative approach was adopted to ensure that diverse perspectives were integrated into the development of the integrated information system. The following strategies were employed to effectively engage stakeholders:

i. **Advisory Committee:** An advisory committee was formed, 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.
ii. **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 insights, discuss challenges, and collaboratively identify key metrics and features for the integrated information system.
iii. **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 express their opinions on the system's design and functionality.
iv. **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 stakeholders with the opportunity to experience the system firsthand.

RESULTS AND DISCUSSION

The integrated information system (IIS) developed for evaluating human capital and ESG indicators features a modular architecture that enhances flexibility, scalability, and seamless integration with existing data sources. This architecture consists of several key components, each serving a distinct purpose within the system. Table 1 summarizes the main layers of the system architecture (Table 1).

Table 1. *Main Layers of the System Architecture*

Layers	Operations	Technologies	Key Functions
Presentation	This layer focuses on the user interface (UI) and user experience (UX), providing a responsive and interactive platform for users to access system functionalities.	React.js	Ensures compatibility across various devices, including desktops, tablets, and smartphones.
Application	The application layer encompasses the core functionalities of the system, including data processing, analytics, and business logic.	Node.js	Efficiently handles asynchronous operations and real-time data processing, facilitating seamless data flow.
Data	Responsible for data storage and management, this layer utilizes PostgreSQL as the relational database management system (RDBMS) to store structured data related to human capital and ESG indicators.	PostgreSQL	Supports complex queries and transactions, ensuring data integrity and consistency, and incorporates data warehousing solutions for historical data storage and trend analysis.
Integration	This layer connects the system with external data sources and APIs, enabling the integration of diverse datasets.	APIs	Supports data ingestion from government databases, corporate reports, and third-party ESG data providers.
Analytics	The analytics layer employs data analytics tools and frameworks, such as Python and R, to conduct statistical modeling, machine learning, and data visualization.	Python, R	Generates insights and trends from the collected data, enabling informed decision-making through dashboards and reporting tools.
Security	This layer implements measures to protect data integrity, confidentiality, and availability, including authentication and authorization mechanisms, encryption protocols, and compliance with data protection regulations.	Security Protocols	Ensures data protection and compliance with regulations.

Key Features of the Integrated Information System

The integrated information system includes several key features that enhance its functionality and usability:

1. Data Input: The system supports various methods for data input, allowing users to upload data manually or automate data ingestion from external sources. Users can input data through:

- **Web Forms:** User-friendly forms for entering human capital and ESG metrics.
- **Bulk Uploads:** CSV or Excel file uploads for large datasets.
- **API Integrations:** Automated data retrieval from external databases and APIs.

2. Data Processing: The system processes incoming data to ensure accuracy and consistency. Key processing functionalities include:

- **Data Validation:** Automated checks to ensure data quality and integrity before storage.
- **Data Transformation:** Standardization of data formats and units to facilitate analysis.

- **Data Aggregation:** Combining data from multiple sources to create comprehensive datasets for analysis.

3. Data Analysis: The analytics layer provides advanced analytical capabilities, including:

- **Statistical Analysis:** Tools for performing descriptive and inferential statistics on human capital and ESG data.
- **Predictive Modeling:** Machine learning algorithms to forecast trends and identify potential risks.
- **Benchmarking:** Comparison of organizational performance against industry standards and best practices.

4. **Reporting and Visualization:** The system includes robust reporting and visualization features, such as:

- **Dashboards:** Interactive dashboards displaying key performance indicators (KPIs) and trends in real-time.
- **Custom Reports:** Users can generate tailored reports based on specific metrics and timeframes.
- **Data Visualization:** Graphs, charts, and maps to facilitate data interpretation and presentation.

5. **User Management:** The system features user management functionalities that allow administrators to:

- **Role-Based Access Control:** Define user roles and permissions to ensure appropriate access to data and functionalities.
- **User Profiles:** Maintain user profiles with relevant information and activity logs.

6. **Collaboration Tools:** The system supports collaboration among stakeholders through features such as:

- **Commenting and Annotations:** Users can leave comments on specific data points or reports for collaborative discussions.
- **Notifications:** Alerts and notifications for updates, data submissions, and report generation.

USER INTERFACE DESIGN

The user interface (UI) of the integrated information system prioritizes usability and accessibility. The UI features a clear and logical navigation structure, enabling 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.

User feedback gathered during the development process has been incorporated to ensure that the UI 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 that helps users familiarize themselves with the system and enhances overall usability.

Data Security and Privacy Measures

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

Table 2. *Data Security Procedures*

Security Measures	Implementation Details	Notes
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.	Ensures user identity verification.
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.	Protects data integrity and privacy.
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).	Maintains compliance and security.
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.	Enhances privacy and trust.
Incident Response Plan	An incident response plan is in place to address potential data breaches or security incidents. This plan outlines procedures for identifying, reporting, and mitigating security threats, ensuring a swift and effective response.	Prepares for potential incidents.
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.	Promotes a security-conscious culture.

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	%
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 results indicated a strong agreement on the importance of assessing human capital and ESG (Environmental, Social, and Governance) indicators. Specifically, 85% of participants rated the significance of human capital assessment as 4 or 5 on a Likert scale, highlighting its crucial role in organizational success, with a mean rating of 4.3 (SD = 0.78).

Similarly, 80% rated the importance of ESG indicator assessment as 4 or 5, yielding a mean rating of 4.2 (SD = 0.83). These findings emphasize stakeholders' recognition of the value that both human capital and ESG evaluations bring to enhancing organizational performance and sustainability.

Respondents were asked about the metrics they currently use to evaluate human capital and ESG indicators, revealing a wide variety of metrics and underscoring the need for standardization across different sectors. A notable number of respondents pointed to "Lack of Data" and "Inconsistent Metrics" as significant challenges, highlighting the urgent need for improved data collection and standardization processes. Stakeholders expressed a desire for an integrated information system that not only provides comprehensive data but also presents it in an accessible and actionable manner. Many interviewees echoed the survey results, stressing the lack of reliable data and advocating for a centralized database that consolidates information from various sources to enhance quality and accessibility. They also called for standardized frameworks for evaluating human capital and ESG indicators, citing the hindrance posed by inconsistent metrics on effective comparisons and benchmarking across organizations. Stakeholders emphasized the necessity of a user-friendly interface in the integrated information system,

highlighting the importance of user input to ensure alignment with their needs and improve usability. Several participants pointed out the need for ongoing training and support to help stakeholders effectively utilize the integrated information system, recommending tailored training programs for different user groups to maximize engagement and effectiveness.

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

With the IIS consolidating data from multiple sources, stakeholders can access information quickly. Prior to its deployment, data was often siloed within organizations, leading to inefficiencies and a lack of comprehensive insights. The IIS has enabled users to obtain real-time data on human capital and ESG indicators from a single platform, promoting transparency and collaboration. The quality of the data collected and analyzed has significantly improved due to the system's data transformation and validation processes. Assessments are now more reliable, thanks to reduced errors and inconsistencies resulting from automated checks and standardization procedures. Users have reported increased trust in the system's data, which is essential for making informed decisions.

The implementation phase included extensive training sessions for users across various sectors. Feedback from these sessions indicated high engagement levels and a positive reception of the system's functionalities. Users appreciated 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 how organizations monitor and evaluate their performance, facilitating timely interventions and strategic planning. The system has fostered collaboration among various 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).

The system encompasses 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 example, 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. Additionally, the system enables organizations to benchmark their human capital performance against industry standards and best practices, fostering a culture of accountability and continuous improvement.

The IIS facilitates ongoing monitoring and evaluation of human capital initiatives, allowing stakeholders to track the effectiveness of training programs, employment policies, and other interventions over time. This capability ensures efficient resource allocation and enables programs to be 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, aligning resources with labor market needs.

The effectiveness of the IIS in evaluating ESG indicators is evident through several key aspects. The system provides a comprehensive framework for assessing ESG indicators, covering 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. Organizations can track their carbon footprint, employee diversity, and community engagement metrics in real-time, facilitating proactive

management of ESG risks (Lagodiienko et al., 2023a; Guo et al., 2024; Kharazishvili et al., 2023; Kopytko et al., 2024). By providing businesses with a platform to transparently report on their ESG performance, the system encourages stakeholder engagement. This transparency not only promotes sustainable practices among businesses but also builds trust among stakeholders, including investors, consumers, and the community. The IIS helps organizations ensure compliance with ESG-related regulations and guidelines. By offering tools for monitoring and reporting ESG metrics, the system assists firms in adhering to global best practices and meeting legal obligations.

Organizations can utilize the system to evaluate the outcomes of their ESG initiatives and assess the effectiveness of their sustainability efforts, informing future investment decisions based on data regarding social and environmental impacts. When comprehensive and high-quality data on human capital and ESG indicators is readily available, policymakers are better equipped to make informed decisions. By leveraging the insights generated by the IIS, policymakers can develop targeted strategies to address specific opportunities and challenges within the labor market and sustainability landscape. The IIS highlights the critical importance of investing in human capital development. Policymakers should prioritize funding for education and vocational training programs that align with labor market demands to ensure the workforce possesses the necessary skills for a rapidly evolving economy. The effectiveness of the IIS in evaluating ESG indicators underscores the need for policies that encourage sustainable practices among organizations. Policymakers should consider incentives for companies demonstrating strong ESG performance, such as tax breaks or recognition programs, to promote broader adoption of sustainable practices.

The IIS has illustrated the value of collaboration among government, the private sector, and civil society organizations. Policymakers should foster partnerships that leverage the strengths of various stakeholders to tackle complex challenges related to human capital and sustainability. The research findings emphasize the need for robust regulatory frameworks that facilitate the collection and disclosure of human capital and ESG data. Policymakers should consider establishing standards for data reporting and transparency to ensure accountability in organizational performance in these areas. The Integrated Information System (IIS) provides a mechanism for continuous monitoring and assessment of human capital and ESG initiatives, fostering a culture of ongoing improvement. Policymakers should embrace this culture, utilizing data to evaluate the effectiveness of policies and programs and making necessary adjustments to achieve desired outcomes.

CONCLUSION

The findings highlight the critical need for investment in human capital, the promotion of sustainable practices, and the encouragement of cross-sector collaboration. As Ukraine progresses on its path toward European integration, the IIS emerges as an essential tool for fostering sustainable development and improving the well-being of its citizens. Successful implementation of the integrated information system necessitates comprehensive training programs for users. Organizations should invest in capacity-building initiatives that equip stakeholders with the skills needed to effectively utilize the system. Customized training sessions can help users grasp the system's functionalities, accurately interpret data, and apply insights to their decision-making processes. An ongoing engagement with stakeholders is crucial for the successful adoption of the IIS. Regular feedback sessions can help identify user needs and preferences, enabling iterative improvements to the system. Forming a stakeholder advisory group can promote continuous dialogue and collaboration among government, business, academia, and civil society. Establishing a robust monitoring and evaluation framework is essential to assess the effectiveness of the integrated information system. Stakeholders should define 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 all stakeholders involved.

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