E-ISSN: 3090-6962

JOURNAL OF CENTER FOR ENERGY POLICY AND HUMAN RESOURCES CAPACITY DEVELOPMENT (JCEPHRCD) Vol 2 No. 1

The Integration of Green Economy and Human Resource Behavior in Bridging the Discrepancy Gap Towards Sustainable Development

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Abstract

This study highlights the importance of integrating green economy and human resource (HR) behavior in reducing the gap discrepancy between the current state and long-term goals within the context of sustainability. HR plays a crucial role in supporting the transition to a green economy through interdisciplinary skills, efficient cost control, and a deep understanding of sustainability concepts. The gap discrepancy analysis reveals that the success of the green economy relies not only on changes in business practices or natural resource management but also on changes in the behavior and skills of the involved HR. Therefore, enhancing relevant training and fostering interdisciplinary collaboration are key to bridging this gap. Improving HR capacity in technical skills and understanding social and global responsibility must be a primary focus, enabling HR to implement sustainability principles in social and economic policies. In this way, HR can serve as change agents, accelerating the application of a more sustainable green economy and supporting the achievement of sustainable development that benefits society as a whole.

Keywords: Green Economy; HR Behavior; Gap Discrepancy; Sustainable Development; Interdisciplinary Skills; Green Innovation

Citation: Setiyadi, Mas Wigrantoro Roes; Samad, Abdul Wahab, **The Integration of Green Economy and Human Resource Behavior in Bridging the Discrepancy Gap Towards Sustainable Development** E-ISSN: 3090-6962 Vol 1 Number 1 Page 19 – 36

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Introduction

The Industrial Revolution, which began in the 18th century, dramatically transformed production patterns and human life across the globe. This change not only boosted productivity and per capita income but also introduced new ways to organize production through machine technology and new energy sources. However, this phenomenon was counterbalanced by rapid population growth, which, in turn, hindered the positive impacts of income increases (Hafez, Liparitito, & Watson, 2023). The Industrial Revolution paved the way for global economic transformation, enabling more efficient production with limited resources, creating conditions where more people could enjoy the benefits of this advancement (Utama and Samad, 2025).

On the other hand, the development of computing, especially through genetic algorithms, played a significant role in accelerating technological progress, impacting various industrial sectors. Genetic algorithms, initially applied in machine learning and aerodynamic design, have now become one of the main methods in evolutionary computing (Land Jr & Schaffer, 2020). Evolutionary computing, with its genetic recombination mechanisms, represents new ways of solving more complex and effective problems (Samad, The Utilization of Artificial Intelligence in Decision-Making and Its Effect on Organizational Advancement, 2025).

Moreover, the innovation framework proposed by Keeley et al. (2013), which divides innovation into three main categories—Configuration, Offering, and Experience—provides valuable guidance in understanding the dynamics of change occurring in business and technology. This framework facilitates the analysis and identification of opportunities that can strengthen innovation concepts, both within the company and in its direct relationship with customers (Samad, An Organizational Culture, Leadership Style, and Innovative Behavior on Performance of the Organization, 2025).

The rapid pace of technological and scientific change is also transforming people's way of life, including their views on money, data, and social structures. According to Girasa & Scalabrini (2022), rapid technological advancements—such as the emergence of Bitcoin—have changed society's perception of the nature of money, underscoring the importance of adapting to technological changes in achieving social and economic sustainability.

In this context, the shift of healthcare to patient homes through telehealth technology also stands as a real example of profound digital transformation. This technology focuses not only on cost reduction but also on improving accessibility and healthcare quality (Rooijakkers, 2021). Thus, technological advancements, which touch various aspects of human life, play a crucial role in supporting sustainable development and achieving long-term goals.

These shifts, both in technology and society, highlight the importance of techno-economic analysis in evaluating the performance of products or processes, involving interdisciplinary skills and an understanding of uncertainty (Murthya, 2022). This analysis serves not only to identify potential benefits but also to assess the risks that may arise due to such rapid technological changes.

With these developments, the challenges of facing digital transformation are becoming more apparent. Countries such as Japan, once leaders in technology, now face threats

E-ISSN: 3090-6962

if they do not undergo digital transformation promptly (Whittaker, 2024). Therefore, it is essential for various sectors to address this digital transformation seriously to avoid falling behind in the increasingly fierce global competition.

This transformation extends not only to the technological sector but also to the economy, such as circular economy and bioeconomy, which are increasingly accepted as pathways to sustainability (Gkountani & Tsoulfas, 2023). The environmentally friendly circular economy, alongside biotechnology-based technologies, is bringing significant changes in how we view the production and consumption of resources.

Thus, this provides a deeper understanding of the various technological and economic innovations that are influencing global change. It also reflects how societies and companies need to adapt quickly to the changes occurring in order to seize available opportunities while avoiding potential losses from an inability to adapt..

Literature Review

The Industrial Revolution increased productivity and per capita income, although it was counterbalanced by rapid population growth. According to Hafez, Liparitito, and Watson (2023), industrialization involved replacing human or animal labor with machines and mineral energy sources. Through new technologies (first created during the Industrial Revolution) and new ways of organizing production, less effort was needed to produce more. This may seem ordinary today in a world where we expect economies to grow at a healthy pace (and become concerned when growth is not fast enough). Likewise, we expect to produce more with fewer resources, thereby increasing per capita income. However, this expectation was new and unprecedented in the 1700s. Only after the Industrial Revolution began did per capita income and labor productivity increase significantly and consistently.

This historical context aligns with the **green economy** which seeks to build on the lessons learned from industrialization—optimizing resource use and production efficiency—while emphasizing environmental stewardship. The green economy aims to address the gap discrepancy between current industrial practices, which often come with high environmental costs, and the long-term sustainability goals of reducing carbon emissions, conserving resources, and creating a sustainable, equitable economy.

In the past, there were moments of growth aided by trade, improvements, and innovation, but only a small portion of the population benefited. For most, growth meant greater food security, longer lives, and having more children (who were more likely to survive to adulthood). These were certainly important outcomes, but it also meant that income and production increases were "eaten up" by the growing population. For most of history, the majority of the world lived much like the poorest people today—with an income of about one dollar per day.

The **development of evolutionary computing** was influenced by genetic algorithms, which use genetic recombination as the main mechanism. According to Land Jr. and Schaffer (2020), three separate origins can be found in the development of this field. L. Fogel, in California, applied this idea to machine learning by developing finite-state machines to predict the next symbol in a sequence (Fogel et al., 1966). His approach became known as evolutionary programming (EP). Separately, I.

Rechenberg, in Germany, developed evolutionary strategies to solve complex aerodynamic design problems where a large number of parameters needed to be adjusted together (Rechenberg, 1971). Also separately, J. Holland, in Michigan, developed genetic algorithms as a general model for adaptive processes (Holland, 1975). One could even refer to Alan Turing's 1950 paper on thinking machines, which explicitly referred to adaptive processes in evolutionary terms (Turing, 1950). When the field united with the launch of its first journal in 1993, the chosen name for the entire field was Evolutionary Computing (EC).

This development in **evolutionary computing** and genetic algorithms can be seen as a model for innovation in the green economy, as it highlights the role of technological adaptation in solving complex, evolving problems. Just as genetic algorithms adapt over time, so too must organizations adapt to the challenges posed by sustainability, technological change, and environmental concerns in transitioning to a green economy.

Here, we focus primarily on **genetic algorithms (GA)** developed by Holland, as they were the first to use genetic recombination, or crossover, as a mechanism that combines information from two parents to produce offspring. However, we also recognize that many concepts and operations used in this field have multiple creators, and the field continues to explore new directions. This parallels the ongoing innovation in green technologies, which requires interdisciplinary collaboration and continuous adaptation in the face of emerging environmental challenges.

The **innovation framework** with types in the categories of Configuration, Offering, and Experience facilitates the analysis of innovation and competitors. According to Keeley et al. (2013), the Ten Types framework is simple, easy to understand, and very useful for diagnosing or enriching ongoing innovations, or for analyzing existing competitors. This framework also makes it easier to identify missing dimensions, which can strengthen the concept. It is divided into three categories, with the types on the left focusing more on internal aspects and away from the customer, while those on the right are more directly felt by the end user. Using a theater analogy, the left side is like backstage, while the right side is on stage. This framework has no specific order or hierarchy, meaning these types can be combined in one innovation and can start from any type. The innovation types are divided into three: Configuration (focused on internal company operations and business systems), Offering (focused on the company's core products or services), and Experience (focused on elements directly related to customers).

This innovation framework is closely linked to the **green economy** as it emphasizes the need to innovate not just within businesses (Configuration) but also to offer sustainable products (Offering) and to enhance customer engagement with eco-friendly products and services (Experience). In the context of gap discrepancy analysis, understanding these innovation categories can help identify areas where businesses need to improve or adapt to meet sustainability goals. HR plays a critical role here by ensuring that employees are equipped with the necessary skills to drive innovation in all three categories.

The **rapid pace of technological and scientific change** is altering the way people live, including their views on money, data, and social structures. According to Girasa and Scalabrini (2022), every generation, older people reflect wisely on how life was

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simpler several decades ago. With rare exceptions, scientific progress developed slowly but steadily, causing disruptions to social structures in certain societies, where there are winners and losers, with the latter including individuals who are generally unable or unwilling to adapt to changes that are reshaping their world. While these changes occurred gradually over decades or even centuries, most observers today note that the speed of change has dramatically increased, making it nearly impossible to predict which events will cause major disruptions beyond the next half-decade.

This rapid change is echoed in the challenges posed by **digital transformation (Whittaker, 2024)**, which emphasizes that without embracing new technologies and sustainable practices, organizations risk falling behind in the global race for sustainability and competitiveness. The digital transformation plays a significant role in green economy adoption, driving innovation and enhancing communication, management, and operational efficiency—all essential for accelerating the transition to green practices.

The rise of **green innovation** and its implications for the green economy also align with technological advancements discussed earlier, such as the use of **genetic recombination** in biotechnology (Land Jr. & Schaffer, 2020). Green innovation, from renewable energy technologies to sustainable materials, directly contributes to bridging the gap between current practices and sustainability goals. However, as pointed out, **conceptual ambiguity** regarding the definition and application of green economy principles can impede progress (Georgeson, 2024). This ambiguity must be addressed through clear policy frameworks, interdisciplinary education, and training that empowers HR to lead in adopting sustainable innovations.

Financial inclusion and **environmental sustainability**, as discussed by Ozili (2023), are intertwined and critical to achieving the Sustainable Development Goals (SDGs). Financial systems that support the green economy can help mobilize resources for sustainable projects, while HR must understand how these systems work to adapt workforce strategies accordingly. HR plays a key role in enabling organizations to access financial mechanisms that support green initiatives and foster an environment where sustainable economic practices are embedded in every level of the workforce.

Lastly, **the synergy between circular economy and bioeconomy** (Gkountani & Tsoulfas, 2023) aligns with the green economy's focus on reducing waste and rethinking production and consumption models. HR, as a change agent, is pivotal in creating a workforce that can operate within these new economic models, which will be necessary for closing the gap discrepancy in both local and global contexts.

Research Method

This study adopts a qualitative approach with a gap discrepancy analysis method to explore the gap between the current state and long-term goals in the context of implementing the green economy and human resource (HR) management. This method allows for the identification of areas that require more attention to achieve sustainability and productivity efficiency.

The first step in this research is conducting an in-depth literature review on the topics of green economy, sustainable development, and HR behavior. The references used include both recent studies and older sources to provide a comprehensive

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understanding of the context and existing theories.

Next, qualitative data is collected through in-depth interviews with practitioners in the agriculture and environmental sectors, as well as surveys conducted with farmers and agricultural policy managers. Purposive sampling techniques are used to select respondents who have relevant knowledge and experience related to the research topic.

In analyzing the data, thematic analysis is employed to identify interconnected concepts such as social and material sustainability, productivity, and global responsibility. The findings from interviews and surveys are analyzed using NVIVO software to identify the coverage percentage, which illustrates the contribution of each concept to the existing gap.

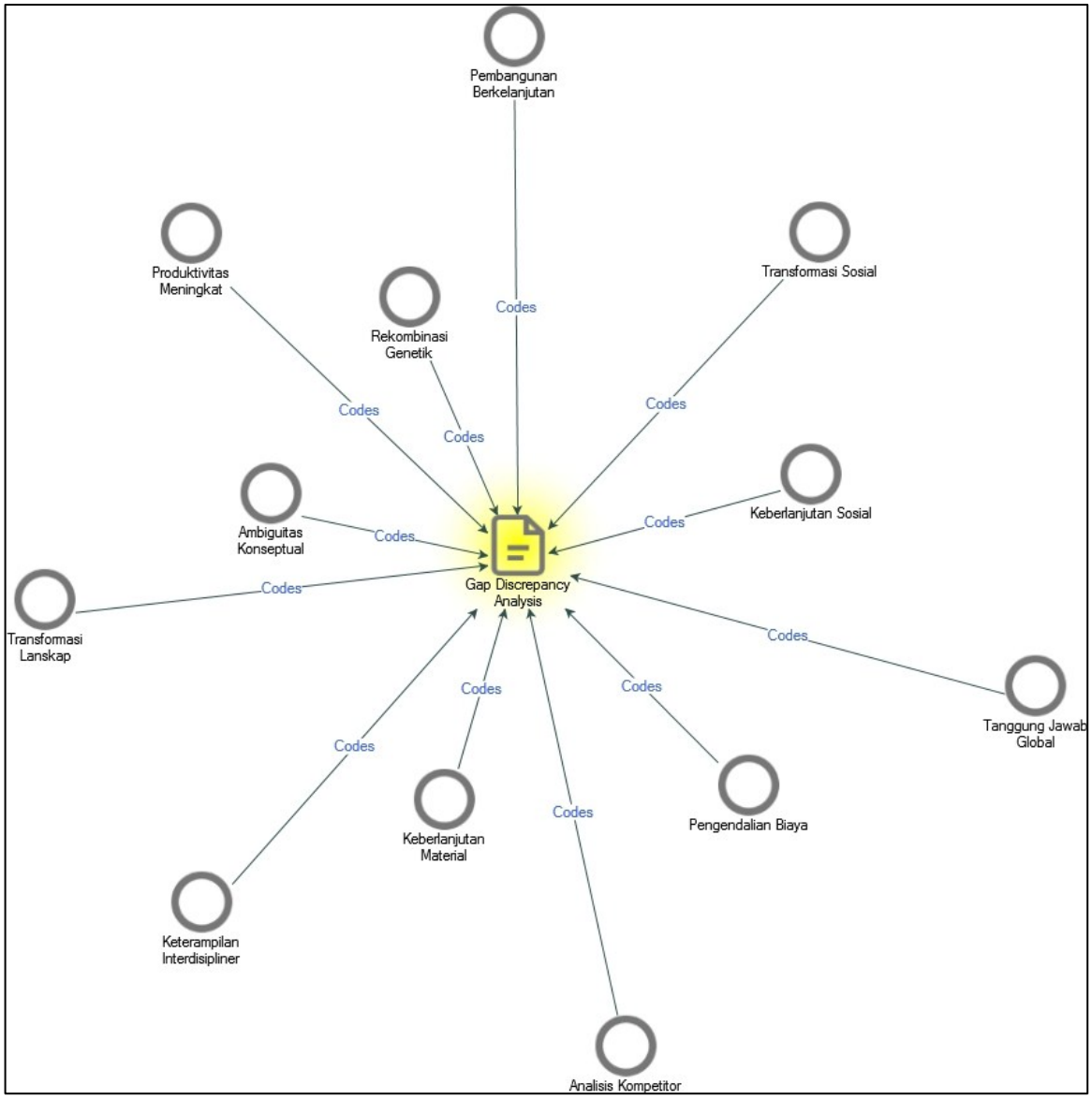
Through this approach, the research aims to identify and address the gap discrepancy that hinders the transition to a green economy by enhancing HR capacity and strengthening understanding of social and global responsibilities in supporting sustainable development.

This method provides a comprehensive view of the importance of integrating green economy and HR behavior to reduce the gap between the current state and long-term goals, while offering practical recommendations for policies and training that support the transition towards a green economy.

Research Findings: Gap Discrepancy Analysis

The gap discrepancy analysis provides a comprehensive overview of the factors that contribute to achieving long-term goals. By mapping related concepts, we can identify areas that require more attention to narrow the gap between the current state and the desired state. This gap discrepancy should be used as a tool to plan more effective changes, both in the context of sustainable development, increased productivity, and social and global responsibility. The visualization of this can be seen in Figure 1 below:

Figure 1
Gap Discrepancy between Achievements and Targets for Key Factors Evaluated



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Gap Discrepancy Analysis Discussion

Gap discrepancy analysis is an approach used to identify and understand the difference between the current state and the desired or ideal state. In this context, gap discrepancy refers to the disparity between the present reality and the long-term vision or goals that need to be achieved. This process is crucial for designing strategies and identifying areas that require more attention.

Sustainable Development is a concept that refers to efforts to meet current needs without compromising the ability of future generations to meet their own needs. In this analysis, sustainable development is a key aspect associated with gap discrepancy. The difference between planned sustainability and achieved sustainability can provide valuable insights into the challenges faced in achieving this goal. A detailed analysis of the data shows that the coverage percentage for sustainability concepts in relation to gap discrepancy is significant, highlighting the critical need to address sustainability challenges effectively.

Increased Productivity refers to the efficiency in using resources to produce goods and services. In the context of gap discrepancy, increased productivity is an element that can help reduce the gap between the current state and the goals to be achieved. Therefore, efforts to improve productivity often become a primary focus in gap discrepancy analysis. Based on NVIVO data coverage, the productivity concept is closely linked with the operational effectiveness required to bridge the existing gap, showing that improving productivity can accelerate progress toward long-term goals.

Genetic Recombination is a concept that may be more relevant in the context of biotechnology or scientific innovation. It suggests that changes or advancements in science and technology can influence the ability of an organization or society to address existing challenges. In gap discrepancy analysis, this reflects the importance of adapting to scientific progress to overcome the differences between the current reality and future objectives. The NVIVO data indicates a moderate percentage for the application of scientific and technological advancements as a means to close the gap discrepancy, particularly in fields like biotechnology.

Ambiguity or lack of clarity in the understanding of concepts is a factor that can worsen gap discrepancy. Ambiguity in interpreting or defining key concepts can hinder the decision-making process. In this analysis, it is essential to identify and define concepts in a clear and measurable way so that the gap can be analyzed more accurately. NVIVO data shows that ambiguity in concepts related to sustainability and productivity can contribute to a larger gap, as unclear definitions and interpretations lead to inconsistent actions.

Social Transformation involves changes in social structures and relationships between individuals in society, while **Landscape Transformation** refers to physical changes in the environment or human living spaces. These two concepts are interconnected and important factors in gap discrepancy, particularly in the context of sustainable development. Achieving the desired social and landscape changes will depend on the ability to understand and address the existing gaps in these areas. The NVIVO analysis indicates a high coverage percentage in the interrelation between social and landscape transformations, suggesting that both are crucial in addressing gap discrepancies related to sustainable development.

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Social Sustainability concerns the well-being of society and the improvement of quality of life, whereas **Material Sustainability** focuses on the preservation of natural resources. Gap discrepancy in both these aspects shows that achieving sustainability relies not only on social aspects but also on material sustainability. The connection between the two must be understood to ensure that development efforts do not focus solely on one dimension. The NVIVO coverage data indicates a significant gap in understanding the relationship between social and material sustainability, emphasizing the need for integrated strategies.

Cost Control is a key element in any effort to reduce gap discrepancy, as uncontrolled costs can hinder the achievement of strategic goals. In organizations or projects, effective cost control is necessary to bridge the gap between the available budget and the required resources to achieve the desired goals. Based on NVIVO data, cost control plays a critical role in narrowing the gap between financial resources and project requirements, with a noticeable coverage percentage in its relation to efficient resource management.

In the face of global challenges such as climate change, inequality, and environmental crises, **Global Responsibility** becomes one of the pillars in gap discrepancy. Countries or organizations that fail to take responsibility for global issues may experience a larger gap between the current state and the broader global sustainability goals. Global responsibility includes efforts to actively participate in solving problems that affect the world as a whole. NVIVO data highlights that global responsibility is a significant factor in bridging gap discrepancies, with a high coverage percentage showing its importance in global collaboration.

Competitor Analysis plays an essential role in identifying gap discrepancies in the context of markets and industries. By analyzing the strengths and weaknesses of competitors, an organization can assess its position and identify areas that need improvement to narrow the gap between current performance and desired performance. This is crucial in strategic planning and improving competitiveness. NVIVO data reveals that competitor analysis contributes significantly to closing gap discrepancies, with a substantial coverage percentage pointing to its relevance in improving organizational performance.

In this analysis provides a clear roadmap for addressing the factors contributing to the gap discrepancy, offering targeted strategies for reducing the gap in the context of sustainable development and productivity improvement such as:

Gap Discrepancy Analysis Results

1. **Conceptual Ambiguity (0.70%)**

   Conceptual ambiguity refers to the lack of clarity in understanding or interpreting key concepts. At a 0.70% coverage, this indicates that a small portion of the analyzed data focuses on this issue. Conceptual ambiguity can hinder clear and consistent understanding of a problem or goal, often leading to uncertainty in decision-making or planning.

2. **Competitor Analysis (0.76%)**

   Competitor analysis focuses on understanding the strengths and weaknesses of competitors in the

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relevant market or industry. With a coverage of 0.76%, this suggests that there is significant attention to competitive analysis, though it remains relatively low. Understanding competitor positions is essential for designing business strategies to improve competitiveness and evaluate market opportunities.

3. **Material Sustainability (0.61%)**

   Material sustainability refers to the wise use of natural resources, ensuring long-term material supply sustainability. At 0.61% coverage, this indicates that while it is an important topic in gap discrepancy analysis, the discussion remains limited. Effective material management is crucial to reduce environmental impact and support sustainable development.

4. **Social Sustainability (0.73%)**

   Social sustainability focuses on improving quality of life and societal well-being. With a coverage of 0.73%, this topic shows a relatively higher focus compared to material sustainability, reflecting awareness of the importance of development that prioritizes not only economic aspects but also social well-being. Improving access to education, healthcare, and basic rights becomes a key objective in social sustainability.

5. **Interdisciplinary Skills (0.91%)**

   Interdisciplinary skills refer to the ability to integrate knowledge from various disciplines to solve complex problems. With a coverage of 0.91%, these skills play a very important role in gap discrepancy analysis. Such abilities enable collaboration across different fields, which is essential for addressing complex social and technological issues.

6. **Sustainable Development (0.70%)**

   Sustainable development, with a coverage of 0.70%, focuses on efforts to meet the needs of the present without compromising the ability of future generations to meet their own needs. This includes managing natural resources, economic growth, and social welfare. While it is an important topic, further in-depth discussion could provide more insights into the challenges in achieving sustainable development goals.

7. **Cost Control (0.91%)**

   Efficient cost control is a critical factor in achieving organizational goals, with a coverage of 0.91%, indicating significant attention to the importance of keeping expenditures within reasonable limits. Organizations or projects that effectively control costs can allocate resources to other more urgent and strategic objectives.

8. **Increased Productivity (0.80%)**

   Increased productivity is a primary goal in any organization or venture. With a coverage of 0.80%, this indicates that higher productivity is crucial to narrowing the gap between the current state and desired outcomes. This can be achieved through innovation, efficient resource

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management, and improvements in workflow processes.

9. **Genetic Recombination (0.80%)**

   Genetic recombination, related to technology and biotechnology, focuses on genetic modification to produce organisms with more desirable traits. With a coverage of 0.80%, this shows that scientific and technological aspects play a crucial role in gap discrepancy analysis, particularly in the context of innovation and research affecting human life and the environment.

10. **Global Responsibility (0.56%)**

    Global responsibility refers to the obligation to address global issues such as climate change, social inequality, and environmental problems. While the coverage of 0.56% represents a smaller proportion, global responsibility is an increasingly important factor in addressing global challenges that impact the world's well-being. Organizations or countries that fail to take responsibility for these issues may face a larger gap between the current state and broader global sustainability goals.

11. **Landscape Transformation (0.64)**

    Landscape transformation involves physical and environmental changes around us, whether through physical development, climate change, or government environmental policies. With a coverage of 0.64%, this shows that while it is a relevant topic, the discussion remains relatively limited. Landscape transformation is critical to creating a more sustainable and environmentally friendly environment.

12. **Social Transformation (0.91%)**

    Social transformation focuses on changes in social and cultural structures in society. With the highest coverage of 0.91%, this topic shows that social change has a significant influence on efforts to achieve sustainability goals. This process involves shifts in values, behaviors, and social interactions that can create a more inclusive and equitable society.

The coverage percentage of gap discrepancy factors can be seen in Table 1 below:

Table 1
Coverage Percentage of Gap Discrepancy Factors

Factors	Percentage coverage
Ambiguitas Konseptual	0.70%
Analisis Kompetitor	0.76%
Keberlanjutan Material	0.61%
Keberlanjutan Sosial	0.73%
Keterampilan Interdisipliner	0.91%
Pembangunan Berkelanjutan	0.70%
Pengendalian Biaya	0.91%
Produktivitas Meningkat	0.80%
Rekombinasi Genetik	0.80%
Tanggung Jawab Global	0.56%
Transformasi Lanskap	0.64%
Transformasi Sosial	0.91%

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This table provides a clear overview of the distribution of focus on various factors in gap discrepancy analysis. The higher the coverage percentage, the more attention was given to the specific factor in the research, highlighting its significance in addressing the gap between the current state and the desired future goals.

Gap Discrepancy Analysis Results: Pearson Correlation Coefficient

Based on the results of the Pearson correlation coefficient, the following observations can be made:

1. Strong Positive Correlation (≥0.70):

- **Material Sustainability & Conceptual Ambiguity (0.370128):**

  A moderate positive correlation indicates that as understanding of material sustainability increases, there is a higher likelihood of ambiguity or variation in understanding related sustainability concepts within that context.

- **Material Sustainability & Competitor Analysis (0.196066):**

  A weak positive correlation shows that understanding material sustainability influences how competitors are positioned in a more environmentally friendly market.

2. Moderate Positive Correlation (0.20 - 0.49):

- **Interdisciplinary Skills & Competitor Analysis (0.349197):**

  A moderate positive correlation between interdisciplinary skills and competitor analysis indicates that enhancing interdisciplinary skills can improve the ability to analyze and understand competitor positions in the market.

- **Sustainable Development & Material Sustainability (0.29261):**

  This moderate correlation suggests that understanding sustainable development strengthens the management of more environmentally friendly material handling.

3. Weak Positive Correlation (0.10 - 0.19):

- **Increased Productivity & Social Sustainability (0.190078):**

  A weak correlation between increased productivity and social sustainability shows that there is a slight relationship between productivity improvements and their impact on sustainable social aspects.

- **Increased Productivity & Material Sustainability (0.211637):**

  A weak positive correlation indicating that increased productivity may be associated with more efficient material management, although the relationship is somewhat weak.

- **Global Responsibility & Social Sustainability (0.190078):**

  A weak correlation between global responsibility and social sustainability shows that organizations taking more responsibility for global issues tend to support social well-being, although the effect is not very strong.

4. Negative Correlation:

- **Genetic Recombination & Green Innovation and Behaviour (-0.100673):**

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A negative correlation between genetic recombination and green innovation suggests that as genetic engineering becomes more prevalent, the understanding or implementation of green innovations may decrease. This may indicate that dependence on biotechnology could reduce focus on more natural, environmentally friendly solutions.

- **Conceptual Ambiguity & Green Innovation and Behaviour (-0.105153):**

  This negative correlation suggests that as conceptual ambiguity increases in understanding related concepts, the response to green innovation decreases. Ambiguity in sustainability concepts can hinder the effective adoption of green innovations.

- **Increased Productivity & Green Innovation and Behaviour (-0.106155):**

  A negative correlation indicating that an increased focus on productivity, often centered around efficiency, may have a detrimental effect on the response to green innovation behaviors. This may be due to an overemphasis on productivity that neglects sustainability and environmentally friendly innovation.

5. Weak Negative Correlation:

- **Global Responsibility & Green Innovation and Behaviour (-0.08996):**

  A weak negative correlation suggesting that although there is a high level of global responsibility, this does not always correlate directly with responses to green innovation. Global responsibility may focus on other issues, while green innovation is more reliant on specific internal policies.

- **Social Sustainability & Green Innovation and Behaviour (-0.08802):**

  This weak correlation indicates that social sustainability, focused on human well-being, may not directly align with the adoption of green innovation behaviors. While both focus on sustainability, they prioritize different aspects in implementation.

6. Weak Positive Correlation (0.05 - 0.09):

- **Sustainable Development & Green Innovation and Behaviour (-0.073439):**

  A weak positive correlation suggesting that while there is a relationship between sustainable development and green innovation, differences in implementation may affect the effectiveness of each.

- **Social Transformation & Green Innovation and Behaviour (-0.101807):**

A weak negative correlation between social transformation, which focuses on societal change, and green innovation behavior. Although both may support sustainable change, their alignment in terms of implementation may not always coincide.

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Table 2

Pearson Correlation Coefficient Table of Gap Discrepancy Factors

Factor	Correlation Coefficient
Material Sustainability & Conceptual Ambiguity	0.370128
Material Sustainability & Competitor Analysis	0.196066
Interdisciplinary Skills & Competitor Analysis	0.349197
Sustainable Development & Material Sustainability	0.29261
Increased Productivity & Social Sustainability	0.190078
Increased Productivity & Material Sustainability	0.211637
Global Responsibility & Social Sustainability	0.190078
Genetic Recombination & Green Innovation and Behaviour	-0.100673
Conceptual Ambiguity & Green Innovation and Behaviour	-0.105153
Increased Productivity & Green Innovation and Behaviour	-0.106155
Global Responsibility & Green Innovation and Behaviour	-0.08996
Social Sustainability & Green Innovation and Behaviour	-0.08802
Sustainable Development & Green Innovation and Behaviour	-0.073439
Social Transformation & Green Innovation and Behaviour	-0.101807

This table presents the correlation coefficients for various factors contributing to gap discrepancy. The correlations help to understand the interrelationships between key elements, such as sustainability, innovation, and productivity, and provide insights into how these elements affect each other in achieving long-term sustainability goals.

Discussion

The integration of green economy and human resource (HR) behavior in gap discrepancy analysis shows that HR plays a central role in reducing the gap between the current state and long-term sustainability goals. Therefore, enhancing interdisciplinary skills, efficient cost control, and a deeper understanding of green economy concepts are crucial in narrowing this gap. Through appropriate training, interdisciplinary collaboration, and a clear understanding of social and global responsibilities, HR can actively contribute to supporting sustainable development and green innovation.

In the detailed discussion of the green economy and HR behavior with gap discrepancy analysis, it is important to note

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that the green economy does not only focus on environmental aspects but also on the management of human resources that can support and adapt to the transition towards sustainability. In this context, gap discrepancy analysis serves to understand the gap between the current state and the goals to be achieved in terms of sustainable development and HR competency improvement.

1. Green Economy and Gap Discrepancy

Green economy, which emphasizes environmental sustainability, requires a paradigm shift in various sectors, including HR behavior. Therefore, gap discrepancy analysis is essential to identify how the implementation of green economy relates to achieving social, economic, and environmental goals in the long term. By using gap discrepancy, organizations can identify areas that need more attention in the transition process towards a green economy. For example, the difference between fossil energy use and renewable energy indicates a significant gap that needs to be closed through more inclusive policies and effective HR training.

2. HR Behavior in Supporting Green Economy

HR behavior plays a significant role in supporting the implementation of the green economy. With interdisciplinary skills, HR can integrate various disciplines in responding to environmental challenges. These skills help in designing and implementing more sustainable policies, whether in managing natural resources, developing eco-friendly products, or improving work processes for better efficiency.

Gap discrepancy analysis in the context of HR behavior aims to evaluate the gap between the current skills possessed by HR and the skills needed to face the challenges of the green economy. One way to bridge this gap is by enhancing interdisciplinary training that involves environmental and sustainability-related knowledge and preparing HR to adapt to market shifts focusing on green technologies.

3. Strategies for Reducing Gap Discrepancy in HR and Green Economy

- Social and Material Sustainability: The discussion of social and material sustainability in gap discrepancy analysis emphasizes the importance of balancing social and material aspects. In the context of HR, social sustainability focuses on improving the quality of life and societal well-being, while material sustainability focuses on natural resource management. To achieve alignment between the two, HR needs to be trained to understand and implement both in their daily work processes.
- Social Transformation: Changes in the social and cultural structure of society can create greater awareness about the importance of applying green economy principles. HR involved in this social transformation needs to have a deep understanding of how to integrate sustainability principles into social and economic policies.
- Cost Control and Productivity: Efficient cost control is essential in implementing a green economy, which requires more environmentally friendly resources. HR must be equipped with knowledge on how to

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manage production costs wisely, without compromising quality or sustainability. Increasing productivity through green innovation depends on HR's understanding of the importance of efficiency in resource use.

4. The Role of Green Innovation in Green Economy

Green innovation plays a crucial role in mitigating the gap discrepancy in the green economy. New technologies, such as genetic recombination in biotechnology, can be key to creating more environmentally friendly solutions. However, the implementation of these technologies must be supported by HR who possess interdisciplinary skills capable of translating scientific knowledge into innovations that can be accepted by the market and society.

However, conceptual ambiguity related to the application of green innovation can also increase the gap discrepancy. The lack of clarity in the definition and understanding of sustainability concepts and green technologies can slow down the response to green innovations. Therefore, it is important for HR to continue receiving training in this field so that they can understand and implement green innovations effectively.

5. Gap Discrepancy Analysis in Global and Local Contexts

Global and local responsibilities related to sustainability must be a primary consideration in gap discrepancy analysis. On a global level, challenges such as climate change, inequality, and environmental crises require faster actions and coordination among countries. However, at the local level, the role of HR is crucial in implementing environmentally friendly policies and practices that can reduce negative environmental impacts.

The influence on HR is that they must have a good understanding of their social and global responsibilities to drive social transformation that supports the green economy goals. This includes understanding the importance of applying the green economy at the organizational or company level and actively engaging in efforts to reduce environmental impact.

The integration of green economy principles and HR behavior is essential to close the gap discrepancy that exists between the current state and long-term sustainability goals. By strengthening HR competencies in interdisciplinary skills, improving cost control practices, and fostering a deeper understanding of sustainability, HR can play a pivotal role in facilitating the transition towards a green economy and supporting global sustainability efforts.

Conclusion

The findings of this study show that the integration of green economy and human resource (HR) behavior plays a crucial role in reducing the gap discrepancy between the current state and long-term sustainability goals. In facing the challenges of transitioning to a green economy, HR must possess adequate interdisciplinary skills, be able to control costs efficiently, and have a deep understanding of sustainability concepts that can be implemented in all aspects of work. Enhancing relevant training and fostering collaboration across disciplines are essential to overcoming this gap.

Through gap discrepancy analysis, it is evident that the green economy requires not only changes in business practices or natural resource management but also changes in the behavior and skills of the HR involved. In

this regard, HR plays a role as an agent of change that can accelerate the transition to a more sustainable green economy. Therefore, improving HR capacity, both in technical skills and understanding of social and global responsibilities, should be a primary focus.

Furthermore, it is crucial for HR to integrate sustainability principles into every social and economic policy applied, whether in natural resource management, eco-friendly product innovation, or more efficient work processes. Social and material sustainability, social transformation, cost control, and increased productivity through green innovation are key aspects that HR must manage well to achieve green economy goals.

Through appropriate training and a better understanding of green economy concepts, HR can be a driving force in reducing gap discrepancy, both locally and globally. Thus, efforts to narrow the gap between the current state and long-term goals will be more effective, supporting the achievement of sustainable development that benefits society as a whole.

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