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RESEARCH ARTICLE

Talent retention in the green economy strategies for a sustainable workforce

Ibrahim Khalil Ibrahim[1], Maysoon Abdulghaini[2], Aeda Hadi Saleh[3], Alaa Jassim Salman[4], Khalid Waleed Nassar Almansoori[5*]

[1] *Al-Turath University, Baghdad 10013, Iraq*

[2] *Al-Mansour University College, Baghdad 10067, Iraq*

[3] *Al-Mamoon University College, Baghdad 10012, Iraq*

[4] *Al-Rafidain University College, Baghdad 10064, Iraq*

[5] *Madenat Alelem University College, Baghdad 10006, Iraq*

*** Corresponding author:** Waleed Nassar Almansoori; Khalid.almansoori@mauc.edu.iq

ABSTRACT

Talent retention is a critical issue in the green economy because companies act between the goals of sustainability and the stability of the workforce. The study will be targeted at defining what makes employees stick to the company in the context of the sustainability-oriented industries where job satisfaction, career development, engagement and mentorship programs are the primary determinants. The study of the correlation between the career growth opportunities, organizational alignment and turnover intention was based on mixed method research design that involved data gathering among 500 staff members working in the renewable energy, sustainable manufacturing and eco-agriculture industry. The respondents on the formal mentoring programs were found to have responded with an increase of 21.1 in job satisfaction and a significant drop in the turnover rates, which shows that the career development program and mentorship are highly effective in employee retention. Moreover, sectoral draw depicts that the area with the lowest turnover (6%), is renewable energy, whereas eco-agriculture works on the most turnover (12%), which faces a lack of career advancement opportunities. Another factor is engagement because the turnover of top performers (those whose engagement levels exceed 85) is less than 3% and the fact that the impact of continued commitment to the work place is associated with retention in the long term. The research observes that career development, development of leaders and well-organized mentoring should be given priority by green economy organizations in ensuring that they end up with a stable and engaged workforce. The longitudinal retention patterns and the effects of the new digital transformation on sustainable talent management is worthy of further research. By bridging these gaps, organizations will be able to develop more efficient workforce strategies which will be sustainable in the long-term as we transition to a greener economy.

Keywords: Talent retention; green economy; workforce engagement; career development; mentorship programs; sustainability; employee turnover

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1. Introduction

Sustainability of the environment, technological advancement and social justice are the way forward in changing the world economy. Green economy has been developed as a kind of roadmap to sustainable development as the world faces the pressing problems of climate change, depletion of resources, and a shift in the demographic composition of the workforce. It strives to a model of economy that saves not only the social equality and well-being of mankind, but also minimizes risks and utilizes earthly resources less - this is green economy. Particularly, it spends important markers of a new growth paradigm based on the low-carbon, resource-efficient, and socially inclusive growth, directly contrary to the conventional models of economic development that have cost natural ecosystems and vulnerable populations. It involves an extreme reorganization of organization hierarchies, controls and team structures of management and the design of a workforce, operations system non less radical than any change in technology[1].

The shift in the world to the green economy needs not only technological change but also a strategic shift in human capital. Souad [1], points out that one of the most vital steps to achieving sustainable economic growth is the establishment of environmentally responsible employment as well as the capacity of an institution to harmonize its talent strategies with environmental objectives. Green industries like renewable energy, recycling of wastes, and sustainable agriculture demand special skills that combine both technical and environmental skills. Furthermore, Ghani et al. [2] point at the fact that without a specific emphasis on the organization of employee retention, the aspect of workforce sustainability is impossible to attain, as it is the organizational learning cycle that keeps the businesses operating within these fast-changing industries innovative and efficient.

The most significant aspect in this change is the ability of the organizations to recruit and retain the best talents to develop green innovations to make the competitive advantages. It makes talent retention a strategic issue, not a human resource activity, in the green economy. The human resource behind this paradigm shift should possess the ability, culture and commitment to design and practice of sustainable solutions, including renewable energy sources, green building, and green agriculture to environmentally manufacturing[2]. Despite any designing, policies and advances in technology will simply fold short of a stable and motivated workforce. It is complicated by the fast changes in green technologies, regulatory conditions, and user demands that institute a demand of highly dynamically fitting, contemporary pools of talents [3].

The adaptation of the workforce thus cannot be cut and paste without the low-carbon economic transformation paradigm. Tsironis [3] points out that training workers on the low-carbon economy entails development of the so-called green skills that would enable a transition between the knowledge and skills of traditional industrial sectors and the knowledge of sustainability awareness. Aina and Atan [4] also show that best practices of talent management can improve sustainable organizational performance when they are incorporated with environmental and ethical aspects. All these findings are indicative of the fact that human resource strategies have to be redefined as the core of green competitiveness, as opposed to the peripheral support role.

Nonetheless, there is no easy way of retaining talent in the green economy. Green sectors do not use money and career hierarchy as the major driving factors as many other conventional sectors do, and green sector attracts workers whose motivation is usually based on strong values, mission, and contribution to the greater progress of the society. In many cases, these workers will value their professional development prospects, meaningful work and organizational culture that aligns with their values much more than conventional measures of career success [4].

This point of view is supported by recent empirical studies. The findings of Kang et al. [5] revealed that talent development was the main driver in promoting the growth of a green economy in the China high-speed rail sector and not technological capital. On the same note, Shao et al. [6] state that green talent management approaches, especially the competency alignment and learning models, maximize sustainable performance in various sectors. These observations underpin that the retaining and growth of environmentally competent employees is required to accomplish sustainable long-term sustainability results.

The implication to such organizations is that these organizations need to re-analyze the traditional ways of retaining people not only in terms of retention of the individual in employment, but also in terms of ensuring that these individuals are fully engaged in the work such that the careers they are undertaking is rewarding and working towards the green economy. Failure to manage these issues may result in high rate of turnover, institutional water wastage, poor organizational performance and undermine the work of the organization to become long term sustainable[5].

The article analyses how organizations can retain talent in the green economy. This begins by providing an overview of the prevailing situation in the green economy about how fast it is expanding, what areas are already flourishing, and what services are in high demand. The rest of the paper discusses these differences and what are the unique drivers and needs of these employees, as opposed to the traditional workforce. According to the existing literature, case studies, and definite examples, the most appropriate practices, which have already been implemented and showed their success in terms of retaining talent in green-oriented organizations, are offered in the given article. The discussion will emphasize the importance of creating a workplace that not only facilitates personal and professional growth but also helps to build a sustainable future with the help of structured onboarding and mentorship programs and further education and development opportunities [6].

Moreover, Ahmad Saufi et al. [7] found out that sustainable work-life balance and perceived job opportunities have a strong moderating power with regard to turnover intention, and this finding implies that retention is not purely a by-product of financial or promotional rewards. Hassanein et al. [8] also emphasize the mediating nature of green innovation in the association among green human resource management (GHRM), employee retention, particularly in the context of service industries that have an environmentally motive. These researches highlight the fact that sustainability-focused organizations have a holistic approach to retention in the form of environmental innovation, job design, and career development pathways.

The article provides partial insight into the current state of talent retention in the green economy besides providing practical recommendations on how an organization can survive. It is possible to say a lot about the importance of such a committed, talented and values-based workforce that it becomes even more daring to say that the bigger and more developed is the green economy, the bigger is the possibility to attract and retain it. By integrating these retention strategies into the organizational operation, we will not only enhance the internal ability of organizations, but will help in the greater good of having a more sustainable, fair and successful world in a larger sense [7].

1.1. The aim of the article

The article will attempt to discuss potential solutions to assist organizations to retain talent within a green economy set up. As the world undertakes stronger actions to reduce climatic change, preserve resources, and promote social equity, the transition to a green economy has come out as a foundation of sustainable development. Nonetheless, besides the ecological and economic motives, the green economy puts specific issues on the workforce management. The need to have highly skilled, dedicated and flexible workforce to green innovations has never been more. It has become a major concern by organizations

therefore to retain such talent at a time when the world is shifting at a breakneck speed towards technological advancement, shifts in regulatory requirements, as well as demand of sustainable products and services.

The article is trying to find some of the factors that make employees stay with the green based sectors of economic activity and explore them. The article would attempt to identify best practices evidence-based interventions with the assistance of an in-depth literature analysis, industry reports, and data that would in turn allow organizations not only to retain their human capital but also engage them in the entire process of sustainability.

The article aims to assist organizations to develop a stable motivated workforce capable of meeting the demands of the green economy through actionable insights. These lessons, in their turn, assist companies in responding in such a manner that they would remain competitive, generate innovation and serve as the key to the larger objectives of environmental and social sustainability.

1.2. Problem statement

Although green economy is increasingly being used as a tool of sustainable development, most organizations are finding it hard to retain the talent needed to achieve their sustainability goals. The conventional techniques of workforce retention do not adequately consider the personal motivation and expectations of the employees in green sectors. The green economy can be very attractive to workers because of the money they get, but also because they need to feel a sense of purpose, career growth, and social and environmental benefit. The conventional rewards, such as promotions and pay increases, can hardly retain these values employees.

What makes this even harder is the pace of change of green technologies and regulatory environments. Companies must continually adapt to emerging needs, yet the ability to deal with the change in question is decreasing in number continuously. High employee turnover and lack of employee engagement are threats to the survival of green enterprises in the long term. Besides, a loss of experience and the loss of efficiency and innovation capacities can be drawn when the experienced employees leave. Such obstacles raise a fundamental dilemma of businesses how to retain the qualified, resolute and multi-skilled human resource to make the shift to the green economy.

This is only worsened by the absence of a unifying framework upon which one can distinguish and fight against the retention challenges unique to the green economy. Even though more and more research is conducted in relation to talent management and sustainability, clear and practical guidelines on how organizational practices can be aligned with the values and expectations of the employees remain under-represented. Companies that turn green without the right retention techniques would be left without achieving their sustainability targets, will not be able to realize the value of green innovations to the fullest, and will be compromising their competitive advantage in an increasingly dynamic business environment.

2. Literature review

The interdependence of sustainability and talent management is validated by an increasing amount of litature. According to Dreichuk and Sytnyk [9] the development of a green and digital economy sustainable corporate culture demands that the company practices are aligned with the values of employees.Hussain et al. [10] also reflect the fact that green practices of HRM have a direct positive impact on employee retention and sustainability of an organization in the small and medium enterprises. Ma et al. [11] further this knowledge by unveiling that a common shared vision of green and a high level of organizational identity of green can significantly enhance the level of commitment of employees to green organizations.

Sustainability efforts have also led to the centrality of green economy, which demands a workforce capable of reacting to the deluge of technology, legislation and market demands in the highly dynamic arena. The literature provides the need to retain talent to remain green with innovation and competitive advantage consistently. Some of the most important issues that influenced the retention of talent in the literature on this topic are organizational culture, career development, and the correspondence of both personal and corporate values. These are seen to be key to enhancing sustainable employee engagement and commitment [8].

One of the areas of concern is the need of the values-oriented organizational culture. Studies have indicated that, in the green economy, financial rewards do not take center stage among the employees. They desire meaningful jobs that can express their personal values and serve the greater social needs. Therefore, the business that pushes toward sustainability not only as an aim of business but also as a part of themselves has the lower rates of turnover and happier staff members [9].

Career improvement is another important factor. When employees can see a way toward a career advancement in an organization, they tend to remain longer and literature has shown this [10]. Continuous learning of the employees - this should be done through training programs and mentorship programs so that the employee skills can be relevant as the green technologies and practices keep emerging [11]. In the meantime, such commitment to career development results in increased employee loyalty as well as retention. Judeh and Khader[12] were able to empirically determine that green training and development programs do not only enhance employment satisfaction, but also largely low turnover rates in tourism and hospitality industries. On the same note, Florek-Paszkowska and Hoyos-Vallejo [13] established that sustainable business practices can be used as a psychological anchor; hence, reducing employee turnover intention. The results are also supported by the results of Ogbeibu et al. [14] discovered that the combination of digital competence and interdependent green tasks by the leaders predicts lower turnover intention, which supports the importance of digital competence in maintaining green human capital.

Furthermore, the consideration of sustainability in the business strategy is also mentioned as one of the most important reasons to retain talents. When the employees believe that the organization cares about environmental and social objectives it cares about them too. The increased sense of purpose and shared mission results in an increased commitment to the organization that will alleviate turnover and improve overall workforce stability [13].

This highlights that several authors are speculating that the conventional methods of retaining employees like financial incentives or ranks-based promotions might not be useful in the green economy. Instead, they require more holistic solutions that would bind quality work culture and self-growth with how they fit with their organization[14]. These measures are sold in the name of stability of workforce that can be used to implement sustainability programs and achieve a long term business success [15].

The overall trend which has been gaining momentum in the literature would seem to imply that the green economy organizations were desperately in need of implementing innovative and value-congruent retention strategies. Focusing on organic company culture, proper career development and actual dedication to environmental programs, companies will travel long way when it comes to attracting and retaining the talent individuals needed to cope with the competitive and dynamic world.

Moreover, Li et al. [15] indicate that ecological restoration and environmental initiatives can help to boost the economies of the regions with qualified and non-transitional human resources. The same tendency is also supported by quantitative data obtained in the European renewable energy sector- Kozar et al. [16] state that the increased employment rate and job retention in green industries are strongly associated with the level of specialization of skills and long-term job quality. Such findings suggest that the problem of retaining talented

employees remains not only a human resource issue but also a macroeconomic factor of the development of the green sector.

3. Materials and methods

The study uses the mixed-methods research design, which involves using both quantitative and qualitative research designs. In particular, the sequential explanatory approach will provide the identification of large statistical trends to be followed with the first help of the survey data, and the semi-structured interviews will be employed to give a more detailed context and explain any patterns that may be observed. It allows making a good assessment of workforce trends, switching between numerical indicators of quantitative measurement and qualitative knowledge of industry professionals [1, 3].

The research protocol had three key elements; (i) quantitative data collection and analysis, (ii) qualitative exploration and (iii) integrative synthesis. The next step was a survey step - a set of Likert-scale assessments of 500 employees in renewable energy, sustainable manufacturing, and eco-agriculture, concerning job satisfaction, career growth, professional development opportunities, and turnover intentions. Inferential statistical analyses t-test and ANOVA and logistic regression modelling were applied to determine which of the two are statistically significant predictors of retention. In the qualitative stage, semi-structured interviews (n 40) with HR leaders and sustainability managers provided valuable information that may be summarized in the following aspects: career engagement, mentorship programs, and value alignment in the green industries. The third and last stage incorporated the lessons learned in both groups of data to give a holistic view of the possible mechanisms of retaining talent [5, 6].

To reinforce methodological depth, this study design adheres to past methodologies used in the cross-sector sustainability research where quantitative and qualitative approaches are used in validity. The practice of green talent management was found to have a strong impact on pro-environmental behavior in the public sectors by Yu et al. [17] which is why mixed-method approaches were considered appropriate. Likewise, Villegas-Ch. et al. [18] suggested to use machine-learning frameworks together to predict retention rates, which provides an interesting perspective on the future of sustainable HR analytics. The current work is based on such approaches to both behavioral and structural aspects of green workforce dynamics..

3.1. Research design and data collection

A questionnaire was posted online comprising of 30 items in Likert scale that ensured a broad geographical base and extensive representation of the sector. The survey used tested constructs that were proven in earlier studies about workforce engagement in the sustainability-oriented companies. The pilot study (n=50) was conducted in order to design the questionnaire in terms of clarity, reliability, and improve internal consistency measures (Cronbachs Alpha = 0.86). The interviews were intended to give a greater depth in information hence the reason why they were conducted online and in-person and recorded before themed analysis. The complementary two approaches provided both the statistical outcomes and the context-related information that enhanced the methodological rigor of the green talent management study[7, 8]. The essential research design components are described in Table 1.

Table 1. Research design elements: approaches, data types, and limitations

Component	Methodology	Data Type	Strength	Limitation
Survey	Likert-scale questionnaire	Numeric	Generalizability	Response bias
Interview	Semi-structured format	Textual	Rich, detailed insights	Time-consuming
Sequential Explanatory	Mixed-methods synthesis	Quantitative + Qualitative	Comprehensive integration	Complexity of synthesis

Component	Methodology	Data Type	Strength	Limitation
Study Population	Green sector employees, HR leaders	Mixed	Representative sampling	Resource-intensive
Duration	12 months	Mixed	Longitudinal perspective	Prolonged data collection

Table 1. (*Continued*)

3.2. Data analysis techniques

3.2.1. Quantitative analysis

The survey data were analyzed using descriptive and inferential statistical methods[16].

1. Descriptive Statistics:

Measures of central tendency: Mean (μ), median (M), mode, and standard deviation (σ).

Normalized scoring ensured cross-sector comparability.

2. Turnover Likelihood Function

To quantify employee turnover probability, the following function was applied:

$$TL=\frac{(1-JS)+(1-CG)+(1-PD)}{3}\times 100 \quad (1)$$

Where *TL* turnover likelihood (percentage); *JS* normalized job satisfaction score (0–1); *CG* career growth score (0–1); *PD* development score (0–1).

3. Inferential Analysis

- T-tests and ANOVA examined group differences in retention rates across industries [9, 12].
- Logistic Regression Model predicted turnover probability based on career development and professional growth variables:

$$P(TI)=\frac{1}{1+e^{-(\beta_0+\beta_1 CG+\beta_2 PD)}} \quad (2)$$

Where $P(TI)$ probability of turnover intention, $\beta_0=-2.3$, $\beta_1=0.5$, $\beta_2=0.3$ (regression coefficients derived from empirical data).

3.2.2. Qualitative Analysis

Interview transcripts underwent inductive thematic coding to identify recurring themes in workforce retention.

- Mentorship Influence on Satisfaction (MIS) Model

To evaluate the impact of mentorship programs, the following equation was applied

$$MIS=\frac{(S_{post}-S_{pre})}{S_{pre}}\times 100 \quad (3)$$

Where S_{pre} pre-mentorship satisfaction score, S_{post} post-mentorship satisfaction score.

This model quantifies the percentage improvement in employee satisfaction attributed to structured mentorship initiatives [13, 15].

3.3. Measurement and validation

To validate survey and interview results, **real-world organizational records** were used:

Turnover Rate (TR) Validation:

- HR retention reports from surveyed organizations were cross-referenced with survey responses.
- Validation Equation

$$\Delta TR=\left|TR_{survey}-TR_{HR}\right| \quad (4)$$

Where TR_{survey} turnover rate from survey, TR_{HR} turnover rate from HR records, ΔTR must be $\leq 5\%$ for consistency.

- Engagement-Turnover Relationship:

Regression modeling was applied to determine the effect of engagement levels on retention:

$$TR=a-bE \quad (5)$$

Where a=20, b=0.2 (regression-derived constants), E employee engagement score (0–100) [17, 18].

3.4. Ethical considerations

All research adhered to ethical guidelines, ensuring confidentiality, informed consent, and voluntary participation. Approval was obtained from an Institutional Review Board (IRB), following global ethical research standards.

Table 2. Ethical research framework

Ethical Principle	Implementation Approach	Oversight Body
Informed Consent	Written agreements	IRB
Confidentiality	Data anonymization	Internal review
Voluntary Participation	Non-coercive recruitment	Ethics committee
Secure Data Storage	Encryption, restricted access	Data security officer

This rigorous methodology will ensure that both numerical and qualitative data will be used to come up with an integrated image of talent retention in green industries. The study is founded on empirically superior and industry based results that are obtained by incorporating the statistical models, practically founded benchmarks of organizations, and the in-depth interviews. A logistic regression modelling, thematic analysis and a turnover validation measures are further measures that give the study and its results academic validity concerning workforce sustainability and retention in the green economy [19, 20].

4. Results

4.1. Retention determinants: job satisfaction, organizational values, and career development

These are some of the interrelated variables, which lead to retention in green economy jobs, which include job satisfaction, cultural fit and value compatibility with the organization, professional growth opportunities, work-life balance etc. These are significant in the motivation of the employees, their productivity and their long-term commitment in the organizations. The more the career growth and development opportunities and propositions, the more the employees are likely to be engaged and remain. Furthermore, the compliance to organizational sustainability objectives can contribute to the establishment of a values-based culture of the workplace, which is likely to promote staff retention.

The analysis includes the detailed statistics of 500 responses to the survey in terms of measuring job satisfaction, career advancement, and other aspects to contribute to retention. Variables on retention such as workplace autonomy, benefits contentment and sustainability engagement. Table 3 also captures other variables with respect to retention, like workplace autonomy, satisfaction on benefits, and sustainability involvement, which gives a more detailed picture of workforce stability in the green industries.

Table 3. Descriptive statistics of key retention determinants in green economy jobs

Retention Factor	Mean	Median	Standard Deviation	Minimum	Maximum	25th Percentile	75th Percentile	Skewness	Kurtosis
Job Satisfaction (JS)	4.2	4.0	0.85	3.0	5.0	3.8	4.5	-0.52	1.72
Career Growth (CG)	4.0	4.1	0.78	3.2	5.0	3.7	4.4	-0.44	1.60
Professional Development (PD)	3.9	4.0	0.79	2.8	5.0	3.6	4.3	-0.61	1.85
Work-Life Balance (WLB)	4.1	4.0	0.82	2.9	5.0	3.7	4.5	-0.47	1.68
Alignment with Values (AV)	4.5	4.5	0.76	3.5	5.0	4.2	4.8	-0.75	1.95
Workplace Autonomy (WA)	4.0	4.1	0.80	3.0	5.0	3.6	4.4	-0.49	1.73
Benefits Satisfaction (BS)	3.8	3.7	0.85	2.5	5.0	3.5	4.2	-0.58	1.82
Sustainability Involvement (SI)	4.4	4.4	0.77	3.3	5.0	4.1	4.7	-0.69	1.88
Turnover Likelihood (TL%)	10.3%	9.7%	3.8%	5.1%	16.2%	8.0%	12.5%	0.41	1.21

The results indicate that the degree of job satisfaction is quite good (mean = 4.2) and 25 percent of the employees were found to be very satisfied (mean = 4.5 and above). This shows that the majority of the employees feel that their work has a purpose, which is also in line with values-oriented employment choices in green industries. The highest rated variable was the alignment with the company values (mean=4.5), confirming the idea that the employees of sustainable industries are mission-oriented and care about the environmental and social objectives of the organization.

The minor discrepancy of career development (mean = 4.0) and professional development (mean = 3.9) can indicate a larger scope of structured career pathways in the future. The standard deviation of benefits satisfaction (0.85) is significantly higher than of other variables which means that there is a wider range of perceptions of salary, bonuses, and incentives by employees.

The likelihood of turnover (mean = 10.3) was also comparatively low, which can be argued in the fact that employees who are associated with the company sustainability goals (mean = 4.4) and employees who possess the feeling of autonomy in the workplace (mean = 4.0) are less inclined to leave. Nevertheless, skewness (-0.49 to -0.75) of the majority of variables shows that there is a slight concentration towards more favorable levels of satisfaction but some number of dissatisfied employees skew the distribution downwards.

These lessons suggest that the career development program and benefits satisfaction are the main aspects of improvement to decrease the turnover risks in green economy employees further.

To further elaborate on this point, we have compared determinants of retention among various green economy sectors such as renewable energy, sustainable manufacturing and eco- agriculture. This industry-specific break down is given in Table 2.

Table 4. Industry-Specific Breakdown of Retention Determinants

Industry	Job Satisfaction	Career Growth	Work-Life Balance	Sustainability Involvement	Turnover Likelihood (%)
Renewable Energy	4.5	4.3	4.4	4.7	7.8%
Sustainable Manufacturing	4.2	4.1	4.0	4.5	9.5%

Industry	Job Satisfaction	Career Growth	Work-Life Balance	Sustainability Involvement	Turnover Likelihood (%)
Eco-Agriculture	4.0	3.8	3.9	4.3	12.1%

Table 4. (*Continued*)

The renewable energy companies have the highest job satisfaction (4.5) and sustainable manufacturing (4.2) and eco-agriculture (4.0). In renewable energy workers, there is also an increased sustainability engagement (4.7), which implies increased compatibility with mission-driven workplaces.

Career growth scores are highest in renewable energy (4.3), which bodes well to the notion that green tech companies follow through on the concept of employee long-term growth. On the other hand, eco-agriculture scores the lowest career growth (3.8) which can be associated both with seasonal employment opportunities and the lack of career progression.

Indeed, the lowest turnover among these sectors is 7.8 (renewable energy) and the highest is 12.1 (eco-agriculture) which proves the existence of a relationship with that relationship ensuring bioeconomy sectors with an organized career progression path, a sustainability embedding and job enjoyment stability rate sector is better than the other.

4.2. Engagement and turnover correlations

Engagement of employees is one of the main factors that promote workforce retention, efficiency and engagement. The truly engaged employees will work harder at the job than the active disengaged employees; in fact, they have a gigantic low propensity than active disengaged employees of seeking outside organization employment. The level of engagement becomes even more significant in the green economy as the employees become motivated by the values of sustainability and corporate social responsibility. On the other hand, employees who are less engaged are not so satisfied with the job, less committed to the organization and more likely to quit. Conversely, the non-engaged employees are at a greater risk of dissatisfaction, reduced productivity and consequently high attrition.

In order to more accurately see the interaction between engagement and turnover, the present investigation examines the feedbacks of a survey conducted of 500 employees of different industries in the green economy. According to the information given in Table 5, one can locate a correlation between the rates of engagement and turnover and the indicators of job satisfaction. Additional causes like employee commitment and intrinsic motivation are added as well to provide a more comprehensive view of the role that engagement of employees plays in retention of workforce.

Table 5. Relationship Between Employee Engagement Levels, Turnover Rates, and Job Commitment

Engagement Level (%)	Turnover Rate (%)	Employee Satisfaction Score	Job Commitment Score	Motivation Level (1-5)
95	1.5%	4.9	4.8	4.9
90	2%	4.8	4.7	4.7
85	3%	4.6	4.5	4.5
80	7%	4.2	4.1	4.0
75	12%	3.9	3.7	3.6
70	15%	3.6	3.4	3.2
65	18%	3.2	3.0	2.8
60	22%	2.8	2.7	2.5

The findings are clearly expressed that the more the engagement the lesser the turnover. The engagement rates exceeding 85% have recorded remarkably low turnover rates1.5-3% and have scored above 4.6 on job satisfaction. The intrinsic motivation levels of these employees are also above 4.5 and the levels of perceived job security are above 90 indicating that the engaged employees have a feeling of stability and compatibility with their work.

The more the rates of engagement are lower, the higher the turnover rates. This, combined with turnover rates of 12-15 percent and the association of that with job commitment, effort and perceived security, even the employees with engagement scores of 70-75 percent are not doing well. Those with engagement less than 65 report higher turnover rates of 18-22% and low levels of satisfaction and motivation. This means that organizations are forced to invest in ensuring high rates of engagement on proactive-basis based on factors like leadership development treatments, increased feedback interventions, and increased involvement of employees in decision-making.

The sector of the green economy will influence the level of employee engagement because of the different aspects of employment security, culture and career advancement opportunities at work place. Although other sectors, such as renewable energy, have structured career structure with high degree of sustainability participation, eco-agriculture might not cope with the challenges of seasonal employment and insufficient career growth in the long term. Table 6 is an industry-specific analysis of the engagement and its correlation with the rates of turnover.

Table 6. Industry-specific breakdown of engagement levels and turnover rates

Industry	Engagement Level (%)	Employee Satisfaction Score	Turnover Rate (%)	Career Progression Score	Sustainability Alignment Score
Renewable Energy	91%	4.7	6%	4.4	4.8
Sustainable Manufacturing	86%	4.5	8%	4.2	4.5
Eco-Agriculture	79%	4.0	12%	3.8	4.3

The best engagement (91%), and hence the lowest turnover (6%), were found in renewable power companies. Employees in this sector register the highest career progression scores (4.4) - and also the highest sustainability alignment scores (4.8) indicating that the higher the level of job fulfillment and the higher the score, the higher the retention rates are likely to go as a result of greater sense of mission and long-term career security.

Next is sustainable manufacturing where the engagement is at 86% and turnover is at 8% meaning that the majority of the employees are very satisfied, but matrixed career progression (4.2) should be improved to retain more employees. Eco-agriculture has the lowest engagement level (79%), turnover pattern (12%), and is likely to remain in the job because of the seasonality of the work, low career advancement opportunities (3.8) and low organizational fit (4.3). Engagement, however, does not suffice, as it turns out, organizations have to provide clear career paths that ensure that the employees remain motivated and to avoid attrition, hence, these findings propose.

4.3. Mentorship and career growth: Influence on retention

Mentorship and promotion have particularly become a key concern on organizations retaining employees in the green economy. Organized mentorship, professional devotion, and career growth have an important effect on employee engagement, which leads to increased job satisfaction levels, increased determination in an organization, and reduced turnover transactions. On the other hand, when employees

lack such a career support system they tend to be less engaged, less motivated and most are likely to pursue alternative employment.

Mentorship programs also offer the employees the map to follow through their career paths with the help of seasoned workers in the same field so that the employees advance their skills through guidance and feedback within a well-organized system. These programs may be as casual as peer mentoring, or as institutionalized as career coaching - and may not impact the retention of employees in a similar way. Consequently, there will be increased engagement levels, stability in the workforce, and interdependence between individual and corporate sustainability objectives in organizations that adopt mentorship programs in the work place.

In this section the authors examine the question whether mentorship influences employee satisfaction and retention on employee survey data of 500 employees. According to Table 7, Different mentorship models are shown to explain their effects to job satisfaction as well as the level of reduction in turnover rate following change of mentorship that include career progression confidence, leadership development score, which approach provides a comprehensive picture of the learning research.

Table 7. Impact of mentorship programs on employee satisfaction and retention

Mentorship Program	Pre-Mentorship Satisfaction	Post-Mentorship Satisfaction	Satisfaction Improvement (%)	Turnover Rate Before Mentorship	Turnover Rate After Mentorship	Career Progression Confidence (1-5)	Leadership Development Score (1-5)
No Mentorship	3.2	N/A	N/A	18%	18%	2.9	2.8
Informal Mentoring	3.5	4.0	14.3%	15%	12%	3.5	3.6
Formal Mentoring	4.0	4.5	12.5%	12%	9%	4.0	4.2
Structured Mentoring	3.8	4.6	21.1%	10%	6%	4.3	4.5
Career Coaching + Mentoring	4.2	4.8	14.3%	9%	5%	4.6	4.7

**N/A- Not Applicable*

The benefits accrued to employees who took part in mentorship programs according to the data are as follows: employee satisfaction; career confidence; and leadership development. The highest increase in satisfaction (treated) (21.1) was among employees who had structured mentorship programs and those who do not receive any mentorship, the latter remained stagnant or decreasing job satisfaction (mean = 3.2). And those companies with formal mentoring or career coaching experienced difference in turnover rate of 10 percent to 6 percent and 9 percent to 5 percent, respectively1.

Employees who go through structured career coaching and mentoring programs also record the highest score (4.6/5) on career advancement and the highest leadership development (4.7/5) score which indicates that employees who have undergone these programs have most confidence in career progression and overall leadership development scores. With the further development of the sphere of sustainability-oriented industries, when mentorship is regarded as the key to career orientation and development of the skills, as proposed by current evidence, the role of mentorship as the vital constituent of workforce retention strategies is indicated.

Actually, employees who have informal mentors record moderate gains (14.3% increment) in satisfaction yet retaliate a chance to depart, indicating that formal programs with proven, evident results are needed in this domain, especially those involving soft skill (leadership) development in the personal

development, outcome measure. Mentorship access should be expanded to organizations, coaching regarding leadership in different levels and structured frameworks to develop talent is to be implemented by organizations, hence increasing the retention rate of employees in green industries.

4.4. Sectoral comparison of retention metrics

Retention in different green economy with workplace stability, career advancement opportunity, and levels of engagement making a significant contribution. New industries and renewable energy present more obvious career ladders, attractive remuneration and mission-oriented workplaces leading to a reduction in turnover. Alternatively, eco-agriculture and sustainable manufacturing industries tend to have issues in recruiting and maintaining a workforce that is predominantly seasonal, has low career mobility and growth prospects and uneven employee engagement practices.

The research comparison studies the happiness, growth, engagement quotas and attrition of constituents in the three main areas of green economy renewable energy, sustainable commercial production and eco-agriculture. Table 8 on the same also incorporates the other variables like the career success index and job flexibility ratings which makes the picture of sectoral retention interactions more wholesome.

Table 8. Sectoral Breakdown of Retention Metrics in the Green Economy

Industry	Job Satisfaction	Career Growth	Engagement Level (%)	Turnover Rate (%)	Career Stability Index (1-5)	Job Flexibility Rating (1-5)
Renewable Energy	4.5	4.3	91%	6%	4.7	4.4
Sustainable Manufacturing	4.2	4.1	86%	8%	4.2	3.9
Eco-Agriculture	4.0	3.8	79%	12%	3.8	3.5

These numbers indicate very high differences in retention parameters within industries. The highest level of job satisfaction (4.5), career growth (4.3) and engagement rate (91%) results in the lowest rate of turnover (6%). As an example, this industry has the highest score of all in terms of career stability (4.7/5) and job flexibility (4.4/5), meaning that they feel secure about the jobs, and enjoy the flexibility of working conditions.

This is followed by sustainable manufacturing that has moderate job satisfaction (4.2), career development (4.1), engagement (86%), and turnover of 8%. In spite of the fact that this industry offers structured career advancement (3.9/5), the reduced flexibility may be one of the possible sources of attrition issue.

One more glimpse of retention in eco agriculture gives one the lowest result of any industry with job satisfaction (4.0) and career growth (3.8) taking the back seat. The engagement level of this industry is lowest at 79% with the highest turnover percentage of 12% with the key reason behind this being less career stability (3.8) and less job flexibility (3.5) with long-term workforce planning being one of the most effective ways to retain employees and make the opportunities of the profession better.

5. Discussion

The results of the article offer an overview of key factors that influence the retention of talents in green programs, with particular focus on job satisfaction, career development, mentoring, and participation of employees. Our results are similar to the available literature and contribute to the knowledge of GHRM, sustainable workforce, and retention strategies, as well. The context of findings presented in the studies

discussed in the previous studies, the implications of the results, weaknesses and limitations and the recommendations to the future research studies.

Findings indicated significant influential factors of green retention and had common denominators in the sectors such as job/ job satisfaction; career growth prospects; and alignment to corporate (organization) values. Interested employees understand that the prospects of career development and mentorship programs are essential parts of the professional life. These results are in line with the research conducted by Kang et al. that stresses on the importance of talent development that has a more significant contribution to the growth of the green economy when compared to the technological innovation. Researchers in the study on China high-speed rail segment concluded that investment in employee education and career development by carriers increased retention and job satisfaction[5]. Similarly, Shao et al. made organizations achieve sustainable performance using the complete competency-based green talent management strategy[6]. This study extrapolated these findings by demonstrating the impact of a formalized mentorship and career coaching on the turnover rates and employee motivation.

One of the most important issues learned during this study is the high degree of the negative relationship between engagement and turnover. Companies where the engagement score goes above 85% have lower turnover rate, which is less than 3% and organizations where the engagement score goes below 70% are experiencing 15%+ turnover rates. This is in addition to the studies of Lin et al.[21] investigated the impact of the green work-life balance and engagement on retention of employees and discovered that an enhanced engagement yields reduced turnover and an improved sustainability performance. Additionally, Wicaksari et al.[22] assert that the promises and rewards will be substantial enough to establish a perennial employee engagement that will result in more dedicated and stable workforces, which is consistent with the results of the present research.

Without something more, engagement alone is insufficient in employee retention, career development and mentoring is a must as well. The staff in structured mentorship programs is shown to have more satisfaction (21.1% higher) and reduced turnover (10% to 6% such) according to the data, which confirms the findings of Judeh and Khader [12], found that green training and employee development program positively influences job delight and retention within an industry with a sustainability focus. In addition, Hassanein et al.[8] have proven the beneficial effect of green innovation in employee-retention in hospitality industry: sustainable organizations tend to exhibit a higher employee commitment and a more sustainable workforce in the long-run[23]. This study builds upon the assumption made by these articles by providing a discovery that career coaching associated with an orchestrated mentorship regime is an effective intervention that lowers turnover/job churn in the green economy jobs.

The article has a unique contribution, as it compares the retention trends by sector in the renewable energy, sustainable manufacturing and eco-agriculture. Broad information demonstrated that the satisfaction (4.5), growth (4.3), and the level of engagement (91%) of renewable energy companies contribute to the reduction in the turnover rate (6 percent). Conversely, eco-agriculture is the most turnover (12%) with less career stability (3.8%) and less career pathways. The findings of our study are in agreement with the findings of the study by Florek-Paszkowska and Hoyos-Vallejo [13],affirm that employees tend to have a lower turnover intention when the organization opts to implement the practice of sustainable business, since they personally tend to be more aligned with the corporate values. In this way, the significance of sustainable development policies in retaining the workforce to green jobs was increased by Souad [1].

Employee engagement, career development programs or professional upskilling program will be the next low hanging fruit to consider in the high turnover sectors. This notion is also supported by Tsironis [3]

who says that the process of switching away of the economy serving an economic base founded on fossil fuels to the low-carbon economy demands special training of green skills and career tracks structure and increased professional development opportunities [22]. This study confirms that companies that focus on mentorship, career planning and development of leadership have high retention rates, particularly in those industries that are struggling with the current sustainability standards.

Moreover, Chen et al. [19] discovered that among young professionals, the concepts of job satisfaction and turnover intention are closely connected with notions of career progression and alignment to career sustainability. According to Sridevi and Reddy [20] intrinsic motivation-based retention and mentoring strategies are effective in minimizing the attrition rate within organizations that depend on knowledge. Applying the same reasoning to the green industries, it implies that long-term retention rates should be achieved by taking into consideration intrinsic motivation, professional development, and organizational sustainability at the same time.

Despite the contribution of this study to the comprehension of talent retention in relation to the green economy, several limitations are to be mentioned. It is worth mentioning that the article is primarily founded on self-reported survey information, and there is an openness to the social desirability bias or inaccurate responses. Some efforts to cross-check the retention metrics with turnover data obtained through HR systems were also made, but such factors as intent-to-leave or future job search could not be measured exhaustively. The same limitation was indicated by Chen et al.[19] when evaluating job satisfaction and intention to leave, they had problems with self-reporting not necessarily being transpired up to the retention results.

The article is narrow in that it concentrates on three distinct fields such as renewable energy, sustainable manufacturing, and eco-agriculture, so it cannot be broadly applied to other industries in the green economy. As an example, Hussain et al.[10] have identified that the dynamics of green HRM practices in SMEs are not the same as those in large corporations, implying that aspects affecting talent retention can be different depending on the size and the structure of companies. Further studies by examining other sectors including green finance, circular economy startups, and climate technology companies would provide a more in-depth picture of the retention issues in the greater sustainability workforce.

The other weakness is the unavailability of longitudinal data to follow the long-term retention trends. The present study will offer a glimpse of existing retention factors without evaluating stability of the workforce over a long time. The key idea to apply machine learning and predictive analytics to better student retention in higher education, highlighted by Villegas-Ch. et al.[18] can be applied to the workforce retention research to provide real-time insights on talent management. The next study at this field should also include longitudinal data analysis and improved predictive modeling tools in order to comprehend long term workforce retention patterns better.

Based on the findings and limitations, some directions of future research are opened. To start with, it is necessary to investigate how AI-based career development tools could be used to improve employee retention in the green economy [24]. The study by Wang and He The analysis by Wang and He emphasizes the benefits of the big data analysis in optimizing talent development and green finance workforce planning, which may potentially be used to address retention analytics using the same approach [25].

Besides, cross-cultural research might offer more profound information on the way various regions apply workforce retention practices in the sustainability areas. Research conducted by Yu et al.[17] highlights that the green talent management policies within the Chinese public sector has a considerable effect on the pro-environmental behaviors, posing a bigger question of whether the policy based green HRM practices can have the same effect in other economies regarding workforce stability.

The research of the intersection of diversity, equity, and inclusion (DEI) initiatives and the green talent retention strategies should be the subject of future research. With organizations scrambling to go green, there will be an urgency to provide a fair access to career development, mentorship programs and leadership roles, which will be central to assist in bringing about an inclusive green workforce.

The more talent retention studies in the green economy are published, the more our results highlight the extent to which workforce stability can be facilitated by engagement, career development, mentorship, and sectoral differences. Their findings are a reflection of the previous research on green HRM, workforce sustainability, and green organizational professional development. However, further research is also needed to fill existing gaps in longitudinal data, industry specifics, and explainability in the context of talent retention systems based on artificial intelligence. After exploring these worlds further, the organization could have the capacity to come up with stronger, more data-based strategies of retaining its best talents in an ever-changing workforce that is becoming a sustainability-based organization.

6. Conclusions

The results of this article indicate the importance of engagement, mentorship, career development, and organization alignment in the stable workforce in the green economy. The multidimensional problem of talent retention exists extremely strongly and above all the relevant intrinsic and extrinsic factors; hereof is defined as pertinent factors that determine the willingness of employees to remain in the position, which is related to identification of sustainability. This project under the exploration of key factors of retention finds the important role of organizations to initiate holistic human resource strategies that drive and facilitate the development of long employee loyalty in the green fields.

The greatest implication of this study is that job satisfaction will not in any way lead to employee retention but rather it will have to be supported by career tracks, professional development programs and a consensus on sustainability. In the data trends, it is evident that the employees who can readily observe a growth opportunity in their condition, in addition to more formalized mentorship, will be registering better rates of workplace devotion and reduced turnover. Career-based retention processes are relatively uncommon even in those organizations that value the potential of sustainability; such processes are able to support the special requirements of a green workforce. Also, this can be used to signify the need to do more than merely engage when the need arises, but rather actively manage the talent which builds on the engagement story and extends that story with organizational long term workforce planning hence the individual feels the pieces of the puzzle falling in place as he or she is locked into the sustainability plan of the organization.

The negative impact of adopting sustainable human-resource practices is a two-fold benefit because the organizations improve on their performance in relation to corporate sustainability and their retention capabilities. The policies that embrace the work-life balance, environmental engagements and reward systems that are meaningful create the workplace culture whereby the employees feel that they are valued to contribute their part in regard to ecological and social goals. The practices will turn sustainability not only to be a corporate objective, but an organizational image that enhances loyalty and devotion. These are further added by empowerment and participatory management, where once the employees are open to participation in the decision-making process, motivated to own sustainability programs, and helped in balancing their career development (through mentorship and career development programs), they will become more emotionally attached to the organization. This empowerment and systematic growth opportunity combination is the foundation of a self-reliant and sound workforce that keeps in step with the environmental and organizational values.

Additionally, the article determines the diverse retention trends across industries with industries that have established career development pipeline and training programs having lower retention rates compared to the eco-agriculture industry where career stability is at the trial phase. These disparities indicate that the various companies in the green economy that work in the different sectors should focus on the micro dynamics of their workforce retentions that are ecosystem-specific. The rate of turnover has compelled industries to look at other ways of employment such as flexible working arrangements, skills training and mentorship as a way of creating long term talent pool.

Another important conclusion of this study is that of mentorship as a strategic tool of retaining the best talent. The outcome of the structured mentoring and career coaching programs is the higher degree of satisfaction and reduced turnover among employees. The achieved results suggest that the mentoring initiatives may not be discussed as another dimension of the talent management strategies but as an important component of the sustainability-oriented industries. Companies that institute mentorship processes, stewardship of high performers and other leadership as well as cross functions strategies will find themselves at a better position to retain employees in a shrinking labor market.

Despite the merits of this study, there are a lot of things that are yet to be examined. Even though the research provides useful hints on how to retain talents in the green industries, its cross-sectional aspect is not in-depth and would not capture the long-term workforce trends. Future research requires longitudinal approaches to track the trends of retention across a broader time frame and examine the effects of career development intervention on permanent stay in the firm. It is also possible to expand the research areas concerning the role of digital transformation in the retention of workforce in these domains, in particular in the correspondence of the talent management approaches driven by artificial intelligence, machine learning and automation with the spirit of the green economy.

Other issues that might be addressed in future studies include differences in generational workforce as far as sustainability-oriented industries are concerned. The green economy labor is successfully moving into the labor market; there exists a significant effect of traditional workers changing to green professionals, yet with fresh professionals entering the green economy, what are they anticipating? What do newer professionals anticipate the growth of their career and how do they envision the work-life balance to be (or, at least, how did they make all the calculations)? To what extent are those younger employees committed to workplace sustainability issues? The insight into these changes will help organizations target their retention plans to the development of workforce priorities and promote further growth of the industry.

The article has indicated the critical linkage between career development, mentoring and employee retention in green economy. It ought to be clear to organizations that what they are working to build is no stronger than the people they employ and thus, the time and resource investments on employee engagement, formal learning, and long-term professional development is not merely a good idea but business necessities. New-age green economy demands business to remain human centric attitude that propels towards the cross-functional human resource practices that revolve around career development, sustainability culture, and workforce innovation to produce a resilient, engaged and future ready workforce.

The digital transformation is on the rising side, which is offering a new chance to linear human-capital management. The specific analytics and intelligent information systems can be implemented to predict the turnover within the working force, understand the dynamics of interaction, and identify the skills gaps in advance. When included in the human-resource planning, incorporating data informed insights will enable organizations to employ proactive and responsive retention strategies. The digital tools and predictive

models allow the green enterprises to predetermine the challenges, create the tailored development plan and have a future-ready workforce which can guarantee the long-term objectives of the green economy.

Conflict of interest

The authors declare no conflict of interest

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