The contribution of green human resource management to the circular economy and performance of environmental certified organisations

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A B S T R A C T

Circular economy has become one of the main strategies to face environmental issues. To enable circular economy, organisations have started acting on their capability to improve their sustainability management. Nevertheless, the contribution of green human resource management to the transition towards a more circular economy has not yet been investigated. Our research aims at assessing the effects of green human resource management to circular economy, to environmental and economic performance and to the environmental reputation of an organisation. We empirically test the distinct role that different green human resource management practices (i.e., green recruiting, green training and involvement, and green performance management and rewarding) have on organisation performance. We also investigate the moderation role of the level of diffusion of the circular economy in the context where organisations operate. The results, from a sample of 819 EMAS-registered organisations, demonstrate that green human resource management positively influence all the organisation performance, even though with some difference between each single practice. Moreover, green human resource management contribute to the transition towards a circular economy without being influenced by external factors such as market demand, competitors' commitment or technological support to circularity. Our research, in addition to shed some light on the relationship between human capital and circular economy, studies for the first time green human resource management with environmental management systems. Finally, the results of our research provide several avenues for further research both for academics and practitioners.

1. Introduction

A general intensification of the concern related to environmental impacts has been registered all around the world. Environmental protection and the implementation of environmental practices have become a priority in the organisations' agenda (Testa et al., 2020a). In order to increase their sustainability and to facilitate the transition towards a more circular economy, organisations, both private and public, have started to pay more attention to their green aspects (Gusmerotti et al., 2020). At the same time, scholars are supporting this trend with a constant growing research literature. Academic literature covers different environmental aspects such as green procurement (Testa et al., 2012; De Giacomo et al., 2019), green marketing (Testa et al., 2020b), circular economy (Marrucci et al., 2019, 2020) , life-cycle assessment (Iraldo et al., 2015) and general management of environmental impact (Daddi et al., 2019a). More recently, both scholars and practitioners turned their attention on green human resources management (GHRM) (Ahmad, 2015).

GHRM is defined as the set of strategies and activities that would encourage a green behaviour of organisations employees to boost a more sustainable and environmentally friendly workplace and overall organisation (Ahmad, 2015). The strong recognition provided by scholars on this topic is confirmed by the high number of literature reviews. Renwick et al. (2013) is probably one of the milestones of the GHRM area. The authors, in addition to map the terrain of the field, identified some literature gaps and suggested future research agendas. They claimed that the different GHRM practices are still not yet fully coordinated to prompt organisation environmental sustainability. Quoting the authors "*organisations are not using the full range of GHRM practices, and this may limit their effectiveness in efforts to improve environmental management*". Indeed, GHRM can be divided into subcategories corresponding to different GHRM practices. According to Renwick et al. (2013), GHRM consists of "attracting/selecting", "training/development", "employee involvement", "empowerment/engagement", "performance management/appraisal" and "pay and reward system". This categorisation is confirmed also by Jackson et al. (2011) which also highlight the

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exceedingly scarcity of the contribution on GHRM and environmental management.

In this study, we addressed the research gap regarding the influence of social, economic, market and other external forces on the approaches to environmental management and as it relates to GHRM with a specific focus on how and to what extent GHRM policies and practices can improve the performance of organisations. Indeed, the aim of this study is to analyse the relationships between the GHRM practices and the performance of an organisations. Nevertheless, we decided to not limit the scope of our research to the environmental performance, but we further expanded the analysis to the economic performance, the environmental reputation and the performance in terms of circular economy. Following this approach, we would provide a totally new contribution not only to the academic literature, but also to practitioners and policymakers.

To achieve our aim, we administered a survey to EMAS-registered organisations obtaining around one thousand contributions. We decided to focus on EMAS-registered organisations due to their high commitment both in continuously improving their performance and in the employee involvement. The Eco-Management and Audit Scheme (EMAS) is the European environmental management system (EMS) which integrated the most widespread and well-known ISO14001 (Daddi et al., 2015). Even though EMSs have been largely investigated either from a practitioner (Ammenberg et al., 2002; Zorpas, 2010), policymaker (Daddi et al., 2014) or academic (Todaro et al., 2019) point of view, they have never been studied in relation to GHRM. Moreover, as proven by Daddi et al. (2021), the role of managers and employees in the green management of the supply chain and in the transition to the circular economy is pivotal. However, regardless this general acknowledgement and the overall importance of the topic, GHRM effects on circular economy and organizational performance are still unexplored.

By taking into account each single GHRM practice, we aimed at understanding the direct contribution of the GHRM activities on organisation performance. Moreover, we measured, for the first time, the effect on circular economy of GHRM. In this case, we also considered the moderation effect of the business environment of the organisation considering the level of diffusion of circular economy practices within market and competitors and the technologic contribution to the transition towards a more circular economy.

The paper is structured as follows. First, we shortly summarize the literature on GHRM, then we in-depth focus on each practice. We then present the adopted methodology, the theoretical model and how we measure the identified variables. Then we present and discuss the results of the research, showing the main implications deriving from our study and critically analysing the findings. The paper concludes with remarks on the contributions of the study and its limitations providing also some insight for future research.

2. Literature review and research questions

In addition to Renwick et al. (2013), scholars have largely contributed to GHRM with several literature review. While some of them focused specifically on GHRM practices such as training (Stefanelli et al., 2019) or employee empowerment (Tariq et al., 2016), most of the authors centred their attention on the general topic of GHRM. Both Pham et al. (2019) and Yong et al. (2019) systematically reviewed the academic literature recognising the positive publication trends on the topic and the diversity of methodologies and approaches adopted. Nevertheless, both the studies claimed the need to increase the attention on the topic considering its importance in the sustainable development of organisations. In particular Pham et al. (2019) suggested to integrate new aspects such as circular economy, supply-chain management, etc. with GHRM. This advice has been collected by many authors. Amrutha and Geetha (2020) considered the implications of adopting GHRM for social sustainability. Al-Minhas et al. (2020) investigated the relationship between GHRM and green logistics, while the connection with green

supply chain management was already studied by Jabbour and De Sousa Jabbour (2016). More recently, Jabbour et al. (2019) explored the nexus of GHRM and circular economy business models framing its study within organisation and management theories. The authors invited future research to provide insights into which GHRM practices are oriented towards the circular economy and how and why these topics are related to organizational performance.

Other literature reviews, although considering the overall concept of GHRM, investigated the amount of attention given to each single GHRM practice. Shahriari et al. (2019) showed that the classic GHRM activity, especially selection/recruitment and training/development, are the most investigated, while processes only indirectly related to GHRM such as discipline, job analysis, employee socialisation, etc. received less attention. This trend is confirmed also by Benevene and Buonomo (2020) which investigated the antecedents and outcomes of GHRM practices.

GHRM is characterised by multi-level dynamics (Renwick et al., 2016) and, thus, it can be studied under different points of view as indicated by the many future research suggested in the literature reviews presented above. Moreover, despite its highly practical connotation, GHRM has been frequently studied in relation to organisation and management theories. In addition to the classic AMO (Ability-Motivation-Opportunity) theory, which is the underground theory of GHRM, scholars framed GHRM into stakeholder theory (Guerci et al., 2016a), dynamic capabilities (Joshi and Dhar, 2020) and contingency theory (Yu et al., 2020).

GHRM studies have provided insights not only to firms' managers, but also to policymakers on building holistic sustainable organisations. Mishra (2017) explored GHRM contribution in emerging countries underlining its possible contribution to increase environmental concerns and to improve government regulations. Nevertheless, as demonstrated by Bombiak (2019), most of the studies have investigated the relevance of GHRM to organisations processes. Considering all the environmental practices that can be employed in HRM at each stage of the personnel process, the opportunity to analyse the influence of GHRM practices on organisations performance are extremely broad. At the same time, this large spectre of possibility may make the identification of linkages hard. To face this problem, scholars have studied GHRM either focusing on a specific practice or considering the general concept of GHRM. Nevertheless, academics have rarely considered at the same all the GHRM practices measuring their single contribution to the performance of an organisation. In order to contribute to the academic debate and to provide useful insights to practitioners, we aimed at evaluating the effect of each GHRM activity on the environmental and economic performance, on the environmental reputation and on the level of adoption of circular economy initiatives of an organisation.

2.1. The study's research questions

Despite an expansion in the research which linked GHRM with various aspects of environmental management and overall environmental performance, GHRM influences on organisation outcomes are still under-specified (Ren et al., 2018). Moreover, although GHRM has been studied in different geographical contexts such as United States (Haddock-Millar et al., 2016), China (Subramanian et al., 2016) or European countries (Guerci and Carollo, 2016) and in different industrial sectors such as airlines (Harvey et al., 2013), hotels and tourist accommodations (Kim et al., 2019), GHRM has never been studied in EMAS-registered organisations, despite EMAS strongly prompts employees' commitment and empowerment. More recently, EMSs have been studied according to their level of internalisation, i.e., the substantial and not formal adoption of the standard requirements within the organisation processes (Testa et al., 2018). Prompting the correct adoption of EMS requirements related to employees would probably match with GHRM practices. Moreover, considering the strong attention paid both by academics and practitioners on circular economy

(Gusmerotti et al., 2019), we widen our research to different aspects of organisations performance, including a specific focus on circular economy.

Circular economy is defined as "*an economic system that replaces the "end-of life" concept with reducing, alternatively reusing, recycling, and recovering materials in production/distribution and consumption processes*" (Kirchherr et al., 2017). Although recently is in the spotlight of scholars (Ghisellini et al., 2016; Ormazabal et al., 2018) and the role of employees have been recognised as crucial in the transition towards a more circular economy (Veleva et al., 2017), the linkages with GHRM has not yet been explored. Nevertheless, even though we aimed to assess the relationship between circular economy and GHRM practices, we cannot overlook that the level of diffusion of the circular economy may be different depending on other factors over which the organisations have no control. For this reason, we studied the moderation effect of "market commitment", i.e., the attention placed by consumers on circular economy; "competitive intensity", i.e., the level of diffusion of circular economy in the specific industrial sector considering both competitors adoption of circular practices and policy-makers pressures; "technologic support", i.e., the support provided by technology in the transition towards a more circular economy. We also aggregated these variables into a single variable named "Circular environment".

In addition to the circular economy performance and to the environmental performance, we focused also on environmental reputation. As far as we known, the only other paper which analysis the nexus between environmental reputation and GHRM was Zhao et al. (2020). The authors highlighted the important role played by managers and GHRM in promoting firms' environmental reputation. Even the linkages between GHRM and economic performance of organisation have been rarely investigated. Zaid and Jaaron (2020) revealed the positive impact of GHRM on economic performance of Palestinian organisation, but the sample is overly narrow and the very particular geographical context may have influenced the results.

For these reasons, to shed some light on these less studied outcomes and to contribute to the debate on environmental performance, we measured the impact of GHRM and of each single GHRM activity on these four organisation performances. Thus, out first hypothesis is:

H1. GHRM positively influences organisation performance.

GHRM begins even before hiring new employees inside the organisation, during the process of recruiting and selecting the newcomers. Integrating environmental responsibilities or including green capabilities as a distinctive element in job specification may contribute to organisation performance. Moktadir et al. (2019) demonstrated that green recruiting is a key antecedent for the exercise of GHRM practices. The additive effects between green and non-green recruitment practices have been also highlighted by Guerci et al. (2016b). Nevertheless, all the existence literature on green recruitment focused exclusively on environmental performance. Thus, our second research hypothesis is:

H2. Green recruitment positively affects organisation performance.

Attracting talented employees in GHRM involves the recruitment of qualified candidates thanks to the environmental performance of the organisation. Bohlmann et al. (2018) confirmed that organisation environmental performance was more important for individuals with a more positive pro-environmental attitude, who are more eager to work for sustainable organisations. Magbool et al. (2016) investigated whether organisations can leverage on their sustainable practices to attract valuable talents. The authors underlined that job applicants have a higher intention to join and willingness to accept a job offer from green organisations. Moreover, Puncheva-Michelotti et al. (2018) proved that "*companies with a great corporate social responsibility reputation take surprisingly little advantage of their image when it comes to attracting job candidates*". So, our third hypothesis is:

H3. Organisations with a greater capacity to attract job applicants

have better performance.

The training programmes of the new employees may be designed to facilitate the integration with the green culture of the organisation. Environmental training to employees mediates the influence of environmental ethics on environmental performance (Singh et al., 2019). Pinzone et al. (2019) proved that green training makes employees more satisfied with their jobs, while Joshi and Dhar (2020) indicated that green training influences the organisations green creativity. Nevertheless, as for green training, Daily et al. (2012) recognised also the importance of green empowerment. Increasing the engagement and the involvement of employees in the organisation green initiatives may add value also to the organisation performances. Green employee empowerment has been also studied in relation to organizational citizenship behaviour toward environment (Hameed et al., 2020) or employees' pro-environmental behaviour (Saeed et al., 2019). Nevertheless, both the direct effect of these GHRM practices to organisation performance have been rarely studied. Thus, we formulated hypothesis four and five as:

H4. Green training positively affects organisation performances.

H5. Green involvement of employees positively affects organisation performances.

Appraisals management is the process by which employees are prompted to enhance their professional skills in order to achieve the organizational targets. One of the biggest barriers of green appraisals management is measuring and gaining data on environmental performance across different organizational departments. Nevertheless, EMSs can help having a measurable outcome of organisation's ability to meet its environmental targets. Although several studies recognised the positive relationship between GHRM and environmental performance (Paillé et al., 2014; Roscoe et al., 2019), job appraisals has been rarely directly connected with overall organisation performance (Ragas et al., 2017). To broaden the debate, our sixth hypothesis is:

H6. Green appraisals management positively affects organisation performances.

Strictly connected with appraisals management, there is green reward management: recognising the employees' contribution in the achievement of a more sustainable organisation. The rewards may be monetary, non-monetary or recognition-based, but all these types of reward aimed at highlighting the employees' commitment towards sustainability. Even in this case, although the topic is strongly studied in the HRM literature (Harris, 2010; Peltokorpi, 2011), reward systems have been rarely investigate connected to sustainability. Only Nejati et al. (2017), even though with a specific focus on green supply chain management, proved the positive influence of green pay and reward.

H7. Green reward system positively affects organisation performances.

To facilitate the understanding of the connections between the different hypotheses, Fig. 1 summarizes the two conceptual models. In Model 1 we considered the overall GHRM in relation to organisation performance, while in Model 2 we included the GHRM practices. Even the moderator was split in three different aspects in Model 2. Each single hypothesis was split in four different outcomes to measure its effect on each organisation performance.

3. Methods

3.1. Sample and data description

The data were collected between April 18th and May 29th, 2020 by administering a questionnaire survey to EMAS-registered organisations. The survey consisted of 12 sections for a total of 27 multiple-choice questions. The survey was provided through the online software
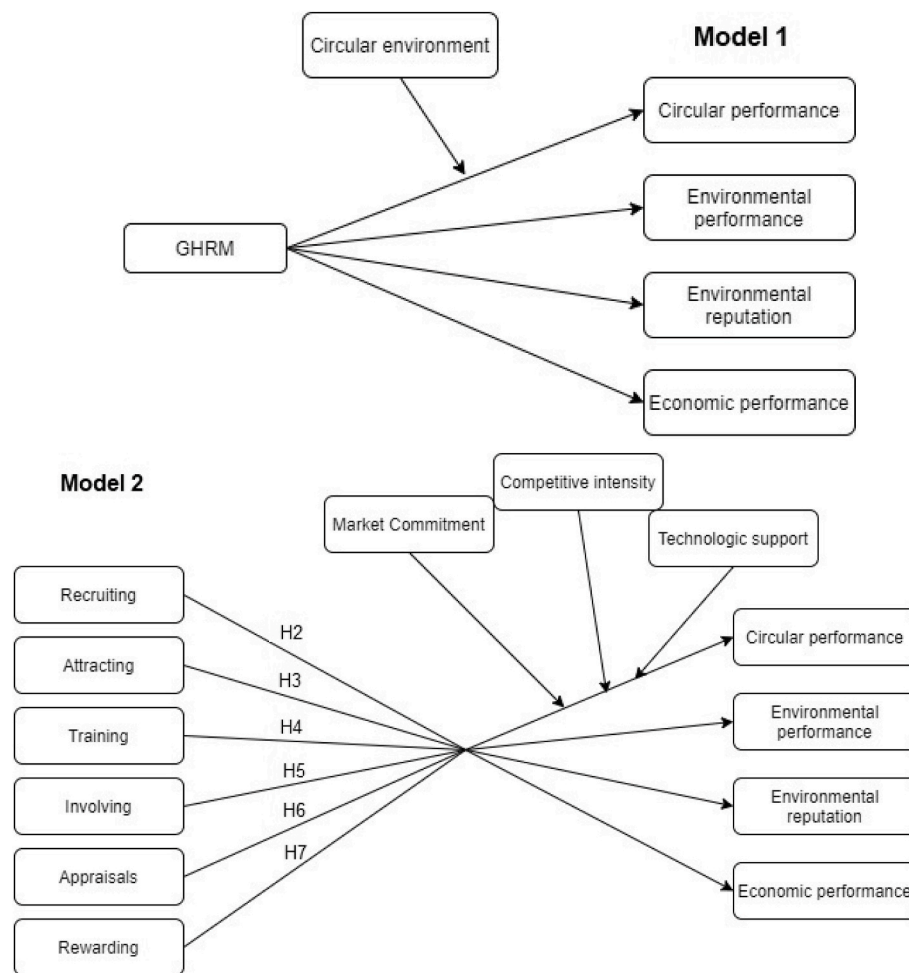
Fig. 1. The two conceptual models and their hypothesis.

"LimeSurvey" to a sample of 3580 EMAS-registered organisations extracted from the EMAS Register provided by the European Commission. A cover letter was included, asking recipients to forward the survey to the Health, Safety and Environment Manager or to the person in charge of these aspects in their organisation. The questionnaire was available in English, French, German, Greek, Italian, Polish, Portuguese, Romanian and Spanish. As of May 2020, 1082 responses were collected, representing a 30% response rate, and 819 completed surveys were considered useable. Considering all the previous literature on EMAS, to date, this was the survey with the highest number of respondents.

In terms of organisation size, 30.65% of the companies in the final sample have 50 to 250 employees, and 38.71% have over 250. Small firms (i.e., less than 50 employees) represent 24.18% of the final sample, while and micro-firms (i.e., less than 10 employees) the 6.47%. In terms of turnover, 37.97% of the firms in the sample report annual revenues of more than €50 million, 24.66% report earnings between €10 million and €50 million and 37.36% report annual revenues of less than €10 million. The final sample encompasses mainly manufacturing sectors (35.78%), but also waste collection sector were well represented (11.36). Even electricity and gas supply sector (7.08), public administration (6.72%) and activities of membership organisations (5.25%) received high number of respondents. Other sectors were all under the 5% threshold.

Regarding the year of registration to EMAS, almost half of the respondents obtained the registration after the 2010 (49.21). Only 10.5% of the final sample registered before the 2000, while 40.29% obtained EMAS between 2000 and 2010. Moreover, the majority of sample is also certified according to the ISO14001 (85.59%) and to ISO9001 (63.37%).

3.2. Variables development

Most of the variables were developed starting with items already adopted in the academic literature and modifying those items according to the topic investigated in our study. By improving and "tailoring" items already presented in other research, we were able to make them more compatible for the sample of EMAS-registered organisations and enabled us to minimize the common method variance.

Most of the measurement items of the GHRM practices were based on the measurement scales proposed by Tang et al. (2018) and Shah (2019). Some items were also rephrased starting from Jabbour (2015), Masri and Jaaron (2017) and Saeed et al. (2019) (see Appendix 1). All the GHRM items were measured using a 5-point Likert scale ranging from one ("strongly disagree") to five ("strongly agree").

In regard to the circular economy context, we considered three different variables: market commitment, competitive intensity and technologic support. All the items of these variables were not yet empirically tested, although their development was inspired by Khan et al. (2020). We asked respondents to the extent to which a set of statements mirror the widespread of circular economy inside of the organisation industrial sector, using the same 5-point Likert scale. Even the measurement items connected to the circular economy performance were not previously adopted in the academic literature, although their development was based on Sassanelli et al. (2019). We asked respondents to grade their agreement with a set of statements using a 5-point Likert scale ranging from one ('Not considering it) to five ('Implementing successfully') passing through two ('Planning to consider it'), three ('Considering it') and four ('Initiating

implementation').

All the other items for the measurement of the organisation performance were taken from the academic literature. They were all measured using a 5-point Likert scale ranging from one (''strongly disagree'') to five (''strongly agree''). While the items for the economic performance derived from Daddi et al. (2016), the items on environmental performance and reputation belong to Daddi et al. (2019b). Regarding economic performance and environmental reputation, we asked respondents to the extent to which a set of statements mirror the competitive advantage experiences by their organisations by participating in EMAS. Instead, for the environmental performance, we asked how the performance of their organisation changed over the last years in the main environmental aspects (see Appendix 1).

Lastly, since an analysis of the factors influencing organizational performance may involve other aspects (Iraldo et al., 2009), control variables were included in the model to account for those aspects that can affect the performance shown by EMAS-registered organisations. For this reason, year of registration to EMAS, organisation size and turnover and the possession of other certification were added to the model.

In Table 1 we summarized the Alpha Cronbach coefficient and the descriptive statistics for the variables used in our study.

4. Results

The assumptions underlying the ordinary least squares (OLS) regression and the reliably and validity of the statistical technique were verified. In particular, we conducted a Shapiro Wilk test to check the normality of the distribution, while we used the non-parametric Kernel density estimator to check the normality of residuals. Through the Breusch-Pagan test we controlled the homogeneity of variance of the residuals checking if heteroskedasticity affected the equations. All the null hypotheses were not rejected (this means heteroscedasticity is not present and we can proceed to interpret the output of the original regression), with the sole exception of environmental reputation. To fix this issue, we took the log of the response variable in order to make heteroscedasticity go away. By determining the tolerance and variance inflationary factors for all variables, we ensured that multicollinearity was not present in our model. Lastly, by running run Harman's single factor score, we verified if data were affected by common method bias considering that the total variance for a single factor is never in excess of than 50%.

4.1. The relation between GHRM and organisation performance

Before focused on the specific GHRM practices, we checked the linkages between GHRM and the organisation performance. Our study demonstrated the positive effect of GHRM on all the organisation performance. Moreover, the circular performance was not affected by the circular environment. As regards the control variables, the year of certification was significative for all the output excluding environmental performance; turnover was valid for the circular performance, while the possession of ISO14001 influenced both the environmental reputation and circular performance (see Table 2).

4.2. The relation between GHRM practices and circular economy performance

The results of our model offer new and valuable insights into the GHRM practices regarding circular economy performance (see Table 3). Specifically, the model shows that some GHRM practices, i.e., recruiting and involving, are effective in increasing circularity in organisations, while other kinds of GHRM practices are not significant, i.e., attracting, training, appraisals and rewarding. Nevertheless, our study

Table 2
Results about the influence of GHRM on organizational performance.

	Coefficient	Standard deviation
GHRM (ENVREP)	0.4174*	0.0398
GHRM (CIRCPERF)	0.2395*	0.0289
CIRCENV	−0.0045	0.1099
GHRM (ENVPERF)	0.2695*	0.3074
GHRM (ECOPERF)	0.5179*	0.4031
EMPLOYEES (ENVREP)	−0.008	0.0353
EMPLOYEES (CIRCPERF)	0.0197	0.0249
EMPLOYEES (ENVPERF)	0.0112	0.0272
EMPLOYEES (ECOPERF)	−0.0473	0.0357
YEAR (ENVREP)	0.0070***	0.0035
YEAR (CIRCPERF)	−0.0049***	0.0025
YEAR (ENVPERF)	−0.0052	0.0027
YEAR (ECOPERF)	0.0098**	0.0036
TURNOVER (ENVREP)	−0.0023	0.0316
TURNOVER (CIRCPERF)	0.0666**	0.0221
TURNOVER (ENVPERF)	0.0019	0.0244
TURNOVER (ECOPERF)	−0.0389	0.0320
ISO14 (ENVREP)	0.1511***	0.0708
ISO14 (CIRCPERF)	0.1615*	0.0477
ISO14 (ENVPERF)	−0.1037	0.0546
ISO14 (ECOPERF)	0.1353	0.0716
R2 (ENVREP)	0.134	
R2 (CIRCPERF)	0.177	
R2 (ENVPERF)	0.094	
R2 (ECOPERF)	0.200	

*, **, and *** indicate the significance at 1%, 5%, and 10%, respectively. Environmental reputation (ENVREP); Circular performance (CIRCPERF); Environmental performance (ENVPERF); Market competitiveness (ECOPERF); Circular Environment (CIRCENV).

Table 1
Alpha Cronbach coefficient and descriptive statistics of variables.

Variables	Average inter-item covariance	items	Alpha coefficient	Mean	SD	Min	Max	N
Recruiting	0.623	3	0.8976	3.521	.833	1	5	819
Attracting	0.644	3	0.8598	3.213	.865	1	5	819
Training	0.369	3	0.8222	3.901	.670	1	5	819
Involving	0.371	4	0.8387	3.826	.665	1	5	819
Appraisals	0.498	4	0.8185	3.435	.780	1	5	819
Reward	0.662	3	0.7601	2.778	.933	1	5	819
GHRM	0.294	6	0.8382	3.446	.593	1	5	819
Market Commitment	0.665	3	0.8851	3.636	.804	1	5	819
Competitive Intensity	0.553	3	0.8550	3.526	.866	1	5	819
Technologic Support	0.523	2	0.7776	3.612	.820	1	5	819
Circular environment	0.391	3	0.7973	3.591	.701	1	5	819
Circular performance	0.997	4	0.7848	2.358	1.12	1	5	819
Environmental performance	0.234	4	0.8185	3.872	.534	2	5	819
Environmental reputation	0.410	3	0.8147	3.884	.709	1	5	819
Economic performance	0.448	3	0.7962	3.088	.746	1	5	819

SD: Standard deviation.

Table 3
Results about the influence of GHRM practices on circular performance.

Circular performance (ENVPERF)		
	Coefficient	Standard deviation
RECRUIT	0.1099*	0.0282
ATTRACT	−0.0258	0.0287
TRAINING	−0.0378	0.0321
INVOLVE	0.1011**	0.0350
APPRAISALS	0.0502	0.0310
REWARD	0.0186	0.0204
MARKET COMMITMENT	0.3641	0.1864
COMPETITIVE INTENSITY	−0.2907	0.1719
TECHNOLOGIC SUPPORT	−0.0173	0.1562
EMPLOYEES	0.0222	0.0256
YEAR	0.0759	0.0224
TURNOVER	−0.0048*	0.0025
ISO14001	0.1856*	0.0486
R2 (WITHOUT MODERATORS)	0.0931	
R2 (WITH MODERATORS)	0.1685	

*, **, and *** indicate the significance at 1%, 5%, and 10%, respectively.

demonstrates that no features of the circular context, i.e., market commitment, competitive intensity and technologic support, affect the organisation's capabilities to improve its circular performance. Moreover, turnover and ISO14001 influence the outcomes. Considering the high economic resources needed to move towards a circular economy, it is very likely that organisations with big turnover are favoured. As regards ISO14001, the possession of both environmental standards may indicate a high commitment into sustainability, and, thus, a more willingness to adopt circular practices.

4.3. The relation between GHRM practices and environmental performance

Even though the relationship between GHRM and environmental performance have been largely investigated, we provided new information focusing on the specific GHRM activities. In addition to recruiting and involving, which are also significant for the circular performance, even training contributes to the environmental performance of the organisation. On the contrary, this time, no control variable reaches the statistical tolerance threshold highlighting that every kind of organisation can improve its environmental performance (see Table 4).

4.4. The relation between GHRM practices and environmental reputation

As regards the GHRM practices, the outcomes emerged in the previous paragraph is confirmed also for the environmental reputation. Recruiting, training and involving are significant, while attracting, appraisals and rewarding do not directly contribute to the environmental

reputation. Our results show that having also the ISO14001 certification and owning the EMAS registration for a long time reinforced the environmental reputation of an organisation (see Table 5). Nevertheless, as stated by Testa et al. (2018), obtaining certifications without concretely internalize environmental practices may be only a greenwashing strategy to respond to stakeholder pressures.

4.5. The relation between GHRM practices and economic performance

Even though the positive effects of GHRM on economic performance have been already demonstrated, other studies did not focus on specific GHRM practices. Our results show that while recruiting is not significative, attracting and rewarding exhibit a positive relationship. Training and involving are both confirmed significative as for other organisation performance. As regards the control variables, like for the environmental reputation, ISO14001 and the year of registration are significative from a statistical point of view (see Table 6).

5. Discussion

Our research is the first attempt to investigate the relationship between GHRM and circular economy. Moreover, it further expands the academic literature on the contribution of the GHRM practices on environmental and economic performance. Lastly, we also included in the analysis the effect of GHRM activities on the environmental reputation of an organisation perceived by different stakeholders. The results of our research contribute to the academic discussion on the adoption of GHRM practices while at the same time allow developing also several practical and managerial implications that may lead to the improvement of both environmental and economic performances.

The most innovative contribution of study is linked to circular economy. Aligning GHRM with circular economy is becoming fundamental to facilitate the transition from the linear model. Our results clearly showed that GHRM positively contributes to organisation performance in the circular economy. Nevertheless, if we focus on the single GHRM practices, we noticed that only recruiting and involving directly influenced the circular performance. Surprisingly, training is not significative. This may be caused by the fact that circular economy concepts and practices are relatively new, but above all they have never been framed in terms of human capital. For these reasons, organisation may have not yet developed training modules aimed at increase employees' skills and experiences on circular economy.

Highlight tasks related to circular economy or sustainability even in the recruiting process and stimulating directly employees to commit to the environmental activities by involving them towards green organizational culture, is crucial to promote 'eco-intrapreneurs' that may increase organisation performance and enable the diffusion of circular practices. Nevertheless, considering that moving to a more circular business model may require huge economic investments, organisations

Table 4
Results about the influence of GHRM practices on environmental performance.

Environmental performance (ENVPERF)		
	Coefficient	Standard deviation
RECRUIT	0.0707**	0.0305
ATTRACT	0.0007	0.0311
TRAINING	0.0757**	0.0347
INVOLVE	0.1228*	0.0379
APPRAISALS	0.0152	0.0335
REWARD	0.0082	0.0221
EMPLOYEES	0.0027	0.0276
YEAR	−0.0054	0.0242
TURNOVER	0.0051	0.0027
ISO14001	−0.0959	0.0525
R2	0.1069	

*, **, and *** indicate the significance at 1%, 5%, and 10%, respectively.

Table 5
Results about the influence of GHRM practices on environmental reputation.

Environmental reputation (ENVREP)		
	Coefficient	Standard deviation
RECRUIT	0.0749***	0.0390
ATTRACT	0.0285	0.0398
TRAINING	0.1478*	0.0444
INVOLVE	0.2497*	0.0484
APPRAISALS	−0.0256	0.0429
REWARD	−0.0106	0.0283
EMPLOYEES	−0.0239	0.0354
YEAR	0.0059***	0.0309
TURNOVER	0.0079	0.0035
ISO14001	0.1646**	0.0672
R2	0.1694	

*, **, and *** indicate the significance at 1%, 5%, and 10%, respectively.

Table 6
Results about the influence of GHRM practices on economic performance.

Economic performance (ECOPERF)		
	Coefficient	Standard deviation
RECRUIT	−0.0083	0.0399
ATTRACT	0.1841*	0.0406
TRAINING	0.1585*	0.0453
INVOLVE	0.1251**	0.0495
APPRAISALS	−0.0239	0.0439
REWARD	0.1040*	0.0289
EMPLOYEES	−0.0485	0.0361
YEAR	0.0358**	0.0316
TURNOVER	−0.0096	0.0035
ISO14001	0.1460**	0.0686
R2	0.2166	

*, **, and *** indicate the significance at 1%, 5%, and 10%, respectively.

with low turnover may be limited in this transition. However, our study demonstrated that neither the market demand of circular solutions nor the level of diffusion of circular strategies within competitors and nor the external contribution received by the technology affect the relationship between GHRM and the circular performance of organisations. The 'circular environment' in which an organisation lives does not influences the possibility to move towards a circular economy. It depends exclusively on the organisation commitment.

Our results mainly confirmed the previous literature recognising the positive effect of GHRM on environmental performance. Nevertheless, while Guerci et al. (2016a) suggested that green training, involvement and appraisals are positively related to environmental performance, whereas green hiring is not, we confirmed green training and involving, but our results recognize recruiting while reject appraisals. The different results may depend by the sample considered in the two studies. While we focused on EMAS-registered organisations obtaining more than 800 contributions, Guerci et al. (2016a) analysed only 74 firms. Nevertheless, beyond sample dimension, what may really influence the results is the typology of the sample. Despite EMAS Regulation prompts employees' involvement boosting their opportunity to really influence environmental management processes, scholars have never studied GHRM applied to this reality. Even though nobody studied EMAS according GHRM before this research, considering EMAS features we expected to find a widespread adoption of GHRM practices. Nevertheless, our results, even though showed a positive contribution of GHRM, highlighted a partial diffusion of its practices as claimed also by Renwick et al. (2013). Indeed, even for the economic performance and the environmental reputational only some of the GHRM activities contribute to the outcomes.

As regards the economic performance, attracting quality applicants and adequately rewarding employees for their environmental performance lead to an increase of the financial performance as suggested also by O'Donohue and Torugsa (2016). Our results showed that recognising employees' contribution to sustainability affect only the economic performance. It seems that to get this economic increase, part of the economic surplus should be redistributed within the employees. Also training and involving contributes to economic performance as already stated by Nikandrou et al. (2008) and to environmental reputation (Ehnert et al., 2016).

Our results allow delineating also several managerial implications. Despite the process of implementation of EMAS should include involving the organisation's workers as this increases job satisfaction and knowledge of environmental issues, the adoption of GHRM practices is still fragmentary. As we can expect, training and involving were already developed within the organisation, although specific sessions on circular economy may help increase organisation performance and employees' commitment on this topic. Our study underlined how performance management of the human resource was still in its infancy even within EMAS-registered organisation. Nevertheless, in order to create a greener

company, performance appraisal systems may include sustainability goals. EMAS, but also other environmental certifications (Marrucci et al., 2021), may play an important role considering that one of the biggest obstacles of green performance appraisal is the difficulty to measure and gather data on environmental performance across different departments. EMAS, or even ISO14001, may help overcome this issue especially in the data collection process. However, after establishing green targets, managers should create a green compensation and reward management system aim to recognize employees' contribution. Such system may boost green awareness and encouraging employees to get involved in green activities prompted by the organisation.

Our results highlighted the importance of building a solid and reliable GHRM system. The positive effects of GHRM on all the organisation performance were demonstrated. If, on the one hand, continuing to increase the diffusion of GHRM activities will increase the performance of the organisation, on the other, the opposite effect is also conceivable. Indeed, the increase of the organisation reputation would improve the attractiveness of the organisation and would allow to set tasks related to environmental protection even in the job descriptions to highlight organisation green commitment and facilitate the recruitment of valuable resources.

6. Conclusions

Our study investigates the relationships between GHRM practices and organisation performance, i.e., environmental and economic performance, environmental reputation and circular economy performance. The results demonstrate the positive effect of GHRM on all the organisation performance. Nevertheless, if we focus on each single GHRM activities, results differ according to the performance analysed. Moreover, our result show that the circular economy performance of the organisation is not affected by any external influence and that the "circular environment" does not moderate the effect of GHRM on organisation adoption of circular practices.

Our outcomes provide useful implications both for academic and practitioners. From a theoretical perspective, we consolidate the debate on the contribution of GHRM on environmental and economic performance. Furthermore, we expand the literature measuring for the first time the influence of human capital on the circular economy. From a managerial perspective, we prove which GHRM activities can lead to the enhancement of organisation performance suggesting weakness and strengths and providing useful strategy to gain a stronger and more widespread diffusion of GHRM practices.

Even though by focusing only on EMAS-registered organisation we investigate for the first time GHRM and EMAS filling a literature gap, different results might emerge if the same models were tested in other organisations. Future studies may consider measuring GHRM effects on organisation performance either on ISO14001 certified organisations and on uncertified organisations. Moreover, our survey was mainly filled in by HSE managers. Thus, different results might emerge if the same models were tested among a broader set of employees. Future research may investigate the employees' perception of the effect of GHRM practices on organisation performance. In this way, we would have a more holistic understanding of the workers' direct contribution to organisation success. Moreover, in our study we limited the sphere of sustainability to the economic and environmental areas, future research may also include social sustainability analysing the contribution of GHRM on this aspect.

Despite these limitations, our research has some relevant strengths. Above all, we linked GHRM to circular economy and to the environmental reputation of an organisation, in addition to the classic environmental and economic performance. Moreover, our research analyses GHRM practices either in an integrated and in a separate way. We also measured the moderate effect of the circular economy context in which organisations operate. Previous studies on GHRM have mostly limited and small samples and none of them focused on EMAS.

Considering EMAS decreasing (Daddi et al., 2017), framed GHRM practices into EMAS may be a powerful strategy to nurture and revamp the European standard. Integrating GHRM practices in the practical experience of organisations may stimulate a green behaviour of organisation employees not only within the workplace context, but also in their daily life activities. Future research should investigate if employees of organisation where GHRM practices are well widespread and integrated, may have a more attitudes on pro-environmental actions or a better citizenship behaviour. Future studies may also consider the mediation role of individual green awareness and pro-social behaviours in relation to GHRM diffusion and effect.

Lastly, even though GHRM have been already studied in relation to management and organisation theories, some room for improvement are still present in this field. Future studies may investigate GHRM framed both in theory applicable to the organisation context (e.g., absorptive capacity or institutional theory) and to single individual (e.g., self-determination theory or ethical theory).

CRediT authorship contribution statement

Luca Marrucci: Data curation, Formal analysis, Writing – original draft, revising the manuscript critically for important intellectual content, approval of the version of the manuscript to be published. **Tiberio Daddi:** Conception and design of study, acquisition of data, analysis and/or interpretation of data, revising the manuscript critically for important intellectual content, approval of the version of the manuscript to be published. **Fabio Iraldo:** Conception and design of study, revising the manuscript critically for important intellectual content, approval of the version of the manuscript to be published.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix 1. Scale items

Only the items highlighted in italics were excluded in the revised measurement model.

Recruitment & job design

1. My organisation has integrated environmental protection responsibilities in each position (Shah, 2019).
2. My organisation has included green and social needs of the company in job description and specification (Shah, 2019).
3. My organisation has incorporated environmental aspect as a task in job description (Shah, 2019).
4. My organisation has incorporated green capabilities as a distinctive element in job specification (Shah, 2019).
5. My organisation has designed and executed innovative positions to emphasize on environmental protection aspects (Rephrased from Shah, 2019).

Attracting & selecting

1. My organisation has incorporated "green aware" criteria in HR staffing policy (Shah, 2019).
2. In my organisation, job candidates are evaluated against green aspects in job interview (Shah, 2019).
3. My organisation attracts new employees thanks to its environmental performance (Jabbour, 2015).
4. My organisation considers candidates' environmental concern, motivation and interest as selection criteria (Rephrased from Saeed et al., 2019)

Training & development

1. In my organisation, the environmental training is offered to all the employees (including outsourced ones) on all the hierarchical levels (Jabbour, 2015; Saeed et al., 2019).
2. In my organisation, the employees are overall satisfied with the environmental training offered (Jabbour, 2015).
3. In my organisation, the topics covered in environmental training sessions are suitable and current for the activities of the organisation (Jabbour, 2015).
4. My organisation assesses in which environmental aspects the employees need training (Rephrased from Shah, 2019).
5. My organisation assesses who need training in environmental management (Shah, 2019).
6. My organisation delivers environmental management training to improve employee awareness, skills, and know-how (Shah, 2019).

Involvement, empowerment & engagement

1. My organisation uses various formal and informal communication ways to develop green values (Shah, 2019)
2. My organisation offers workshops, forums or joint sessions for staff to improve environmental behaviour and exchange their tacit knowledge (Masri and Jaaron, 2017; Saeed et al., 2019).
3. In my organisation the top managers use teamwork to successfully manage and produce awareness of the environmental issues (Masri and Jaaron, 2017).
4. My organisation recognizes employees as a key stakeholder in environmental management (Saeed et al., 2019).
5. My organisation emphasizes a culture of environmental protection stressing values of green safety and presenting green practices (Rephrased from Shah, 2019).
6. My organisation has procedure of helplines and green whistle-blowing (Shah, 2019).

Performance management & appraisals

1. My organisation provides regular feedback to the employees or teams to achieve environmental goals or improve their environmental performance (Masri and Jaaron, 2017; Saeed et al., 2019).
2. My organisation incorporates corporate environmental management objectives and targets with the performance evaluation system (Masri and Jaaron, 2017).
3. My organisation establishes green targets, objectives, and duties for each employee across organisation (Shah, 2019).
4. In my organisation, managers have established goals to attain green targets incorporated in periodic evaluations (Shah, 2019).
5. My organisation focuses on communication of green goals (Shah, 2019).
6. In my organisation environmental incidents are constantly assessed and recorded (Shah, 2019).

Pay and reward system

1. My organisation offers non-monetary or monetary rewards based on the environmental achievements (sabbatical, leave, gifts, bonuses, cash, premiums, promotion) (Masri and Jaaron, 2017; Saeed et al., 2019).
2. In my organisation environmental performance is recognised publicly (Masri and Jaaron, 2017; Saeed et al., 2019).
3. My organisation provides incentives to encourage environmentally friendly activities and behaviours (car-sharing, etc.) (Rephrased from Saeed et al., 2019).
4. My organisation plans environmentally friendly activities for the employees.

Market commitment

1. Customers in our market are very receptive to circular practices.
2. Customers expect circular economy initiatives in our industry.
3. Suppliers are very receptive to circular practices.

Competitive intensity

1. Competition on circular economy is very intense in our industry.
2. Competitors have already introduced circular practices in the past years.
3. Public institutions expect circular economy initiatives in our industry.

Technologic support

1. Technological developments provide big opportunities for circular economy in our industry.
2. Many circular practices have been made possible through technological breakthroughs in our industry.

Circular performance

1. We are adopting a life cycle management approach.
2. We are designing our products in such a way that it can be easily upgraded/repaired/refurbished/remanufactured and/or it is entirely biodegradable/highly recyclable/easily recoverable at the end-of-life.
3. We are using closed-loops in the production process, eliminating leaks, and minimizing the waste generation.
4. We are increasing the material and energy efficiency of our production process.
5. We are transferring (or selling) bi-products/excess energy of our production process to other organisations.
6. We are offering services to customers for upgrading/repairing/refurbishing of our products.
7. We are collecting our end-of-life products/product parts for recycling/materials recovery.
8. We are using bi-products/end-of-life products/recycled materials/excess energy as an input in our production process.

Environmental performance

1. Energy efficiency.
2. Efficiency in the use of materials (e.g. chemicals, raw materials).
3. Water consumption.
4. Waste production.
5. Quality/quantity of wastewater effluents.
6. Quality/quantity of air emissions.
7. Noise emissions

Environmental reputation

1. Improved organisation trust towards customers/suppliers (Daddi et al., 2019a)
2. Improved organisation image towards government authorities (Daddi et al., 2019a).
3. Improved organisation image compared to not-EMAS competitors' reputation (Daddi et al., 2019a).
4. Improvement in relationships with local communities and reduction of conflicts (e.g. public complaints) (Daddi et al., 2019a)

Economic performance

1. Improvement of efficiency in the use of natural resources and energy, with its corresponding reduction of costs (Daddi et al., 2019a).

2. Increase in turnover (Daddi et al., 2019a).
3. Increase in market share of your main products (Daddi et al., 2019a).
4. Increase in exports (Daddi et al., 2019a).

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