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Multidimensional scale for green internal marketing in Italian higher education

Umar Farooq Sahibzada
Business School for the Creative Industries, University for the Creative Arts − Epsom Campus, Epsom, UK and Asia-Australia Business College, Liaoning University, Liaoning, China

Michele Meoli
Department of Management, Information and Production Engineering CCSE, Cisalpino Institute for Comparative Studies in Europe, Universita degli Studi di Bergamo, Bergamo, Italy, and

Nadia Aslam
School of Tourism and Hotel Management, Dongbei University of Finance and Economics, Dalian, China

Abstract

Purpose – This study aims to develop a measurement instrument for green internal marketing (GIM) in a knowledge-intensive industry (Higher Education).

Design/methodology/approach – This study consists of four phases, using a mixed-methods design. Study 1 used a systematic literature review, interviews and focus group discussions (n = 30) to identify five categories and 29 initial items. Study 2 used exploratory factor analysis for scale purification and refinement. The study confirmed a 20-item and five-dimensional scale. The final data collection (n = 576) was conducted for Study 3 using the quantitative approach and establishing the scale's predictive validity. Study 4 checked the impact of GIM on knowledge worker performance using Smart-PLS 4.

Findings – This study found that GIM has five dimensions, which work as a catalyst in the knowledge-intensive sector. The study also found a significant impact of GIM on knowledge worker performance.

Originality/value – The study's innovative approach involves the development of a multidimensional scale and an examination of its effect on the identification of variables by GIM, specifically on the academic performance of knowledge workers in higher education. The study provides valuable recommendations for professionals and academics on achieving knowledge worker performance within higher education institutions effectively.

Keywords Sustainable development goals, Knowledge worker performance, Scale development, Higher education, Green internal marketing

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1. Introduction

The significance of sustainable production and consumption has been recognized as a crucial area of focus for policymaking and research since the mid-1990s, as evidenced by the World Business Council for Sustainable Development, OECD and UN environmental reports (Stoeckl and Luedicke, 2015). Sustainable development is currently receiving increased attention due to the ongoing global financial crises, the complexities of post-Brexit circumstances and the changing corporate social responsibility environment (Stoeckl and Luedicke, 2015). Consequently, organizations worldwide are currently engaging in an environmental transformation of their operations to minimize the environmental detrimental impact (Cotton *et al.*, 2023; Dangelico *et al.*, 2017; Fraj *et al.*, 2011; Shrivastava, 1995). This transition has given rise to various concepts including environmental, green and sustainable marketing. However, the notion of green marketing has garnered much scholarly attention (Farooq Sahibzada *et al.*, 2021). There has been significant research on green marketing, however, the focus has primarily been on external green marketing practices. These practices include studying consumer attitudes and behaviors toward green products, identifying market opportunities, segmenting the green market built on consumer needs, emerging positioning tactics and generating marketing mix plans and HR strategies that promote sustainability (Amaya *et al.*, 2024; Dangelico *et al.*, 2017; Mehraj and Qureshi, 2020; Yao *et al.*, 2019).

The growing competitiveness and high expectations of consumers in higher education institutions (HEIs) have emphasized the importance of internal stakeholders as modern companies that seek to engage customers in service supply and enhance their value (Rathakrishnan *et al.*, 2024; Sahibzada *et al.*, 2019). The importance of internal customers (academicians) in shaping the experiences of external customers (students) is not commonly acknowledged by most scholars, which is a key aspect of the green internal marketing (GIM) concept (Papadas *et al.*, 2019). GIM was introduced as a concept that posits workers as internal consumers whose expectations should be satisfied before aligning through strategic marketing objectives and ultimately addressing external clients' needs (Papadas *et al.*, 2017). The central doctrine of this ideology is the mutual distribution of value among the stakeholders working within the organization who are expected to foster a reciprocal relationship by enhancing their perceptions of internal worth.

Although green narratives are prevalent in the marketing literature, there is a startling lack of empirical studies that guide organizations in incorporating and implementing internal green marketing into their day-to-day operations (Sahibzada *et al.*, 2019). Thus, it is evident that internal green marketing does not attain its potential to enhance the quality of life for its internal customers, i.e. employees, nor does it contribute positively to the ecosystem. In the past, internal marketing strategies that centered on economic reasoning, technological solutions, green innovations and environmental enhancements failed to generate substantial competitive advantages and value for organizations, nor did they bring about transformative changes for society or individuals (Geels *et al.*, 2015; Kotler, 2011). This research aims to provide a thorough and inclusive analysis of the GIM strategies implemented in the Italian higher education industry. To achieve this objective, the study proposes creating a theoretical framework encompassing the various aspects of knowledge-intensive organizations to capture the intricacies of internal green marketing.

Academics (knowledge workers) possess various requirements that need to be fulfilled, as well as expectations and objectives for the future that must be achieved (Sierra-García *et al.*, 2024). Individuals actively engage in the work and execute duties that meet their requirements and help them achieve their objectives. To achieve the desired objective, it is important to focus on improving internal factors within the organization. Previous studies

have suggested the importance of enhancing internal organizational communication, training and development, rewards, work support and work structure in promoting green initiatives within the organization (Foreman and Money, 1995; Fu, 2013; Lings, 2000; Narteh, 2012; Pantouvakis, 2012; Papadas *et al.*, 2019; Sahibzada *et al.*, 2019; Weng *et al.*, 2016; Yao *et al.*, 2019).

Academic professionals are often seen as the internal customers of educational organizations, while students are typically regarded as outside customers (Latif *et al.*, 2019). The enhancement of internal customer satisfaction levels is expected to lead to improved knowledge worker (academics) performance. In the knowledge-based industry, the prominence of GIM is increasingly recognized, as the success of organizations is largely contingent upon the caliber of their workforce (Sahibzada *et al.*, 2019). The primary objectives of HEIs are to impart specialized knowledge in a particular field, foster intellectual growth in students and promote overall academic development (von Knorring *et al.*, 2024). Furthermore, these institutions aim to play a vital role in formulating national development plans (Aung and Hallinger, 2023). The importance of investigating the enhancement of knowledge worker performance through internal green marketing in HEIs is heightened by the fact that a high level of interaction between employees and customers characterizes these institutions (Al-Alawneh *et al.*, 2024). In HEIs, the interaction level is notably higher than that of other service-providing organizations. Due to its considerable importance, conducting a formal examination of this subject is crucial.

Due to the considerable importance of this topic, it is crucial to formally examine these subject lecturers, senior lecturers and professors, who serve as the primary providers of services. Moreover, it is essential to classify academicians as those who play a vital role in delivering services. They are instrumental in executing specific service designs and are integral to planning. Academics can provide valuable insights into the components that lead to a significant educational experience (Latif *et al.*, 2019). Negative impacts on the quality of services rendered by academics in higher education may result from diminished motivation and dissatisfaction (Latif *et al.*, 2019). This, in turn, can lead to dissatisfaction among students. Supporting exceptional research and development for academicians and enhancing their worker performance is crucial to improving green practices in universities. This can be achieved by meeting the needs of academic (knowledge worker) staff.

Former studies predominantly focus on exploring a unidimensional aspect of internal green marketing in different service sectors, neglecting the knowledge-intensive sector (Papadas *et al.*, 2019; Qureshi and Mehraj, 2022). Despite the extensive findings in management research that highlight the importance of using context-dependent scales, studies have been scarce focused on developing measures that are tailored to specific contexts. There is a dearth of research on internal green marketing within higher education, especially regarding the development of multidimensional measurement scales. It is crucial to point out that, apart from explorations within a unidimensional scope (Papadas *et al.*, 2019) and (Qureshi and Mehraj, 2022), no multidimensional measurement instrument for internal green marketing currently exists. This gap in the research tools available is a significant oversight, underscoring a pressing need for advancements in this area to understand better and quantify internal green marketing metrics. Moreover, there has been a notable dearth of research in the realm of the Italian higher education sector (Civera and Meoli, 2023). This study represents the first attempt to evaluate the multidimensionality of GIM within the context of higher education.

In addition, Italy has experienced a remarkable transformation in higher education over the past five years (Civera and Meoli, 2023). The dynamic evolution of HEIs in Italy has significantly reshaped the country's higher education system, transitioning it from an exclusive

domain to a more inclusive and accessible one. This transformation has presented challenges for the Italian government and HEIs. Pursuing a GIM in Italy is crucial as competition among universities is intensifying substantially owing to the swift growth of higher education and the increase in university enrollment (Civera and Meoli, 2023). Consequently, Italian university professors face heightened work demands and may experience considerable stress from teaching responsibilities, research obligations, academic publication requirements and assessment of professional standing (Civera and Meoli, 2023). The study significantly contributes by introducing a multidimensional measurement tool for assessing internal marketing. While existing literature has predominantly focused on unidimensional internal marketing scales, there is a noticeable dearth of research on multidimensional measurement tools for this area. Addressing this gap, the present study presents a comprehensive five-dimensional instrument tailored for appraising internal marketing constructs in HEIs. Furthermore, this study enriches the internal marketing literature by proposing a context-dependent scale, responding to the scholarly demand for internal marketing measures tailored to the specific nuances of higher education. In addition, it substantiates the scale by assessing its impact on identifying variables through green internal marketing, specifically concerning the academic performance of knowledge workers in Italian higher education.

2. Literature review

2.1 Fostering green internal marketing in higher education

GIM is a comprehensive approach that involves educating and enlightening all employees within an organization about environmental policies and their significance in attracting and retaining customers, as well as promoting proactive efforts to deliver a superior green customer experience (Qureshi and Mehraj, 2022; Signori *et al.*, 2019). GIM entails promoting green values to cultivate a more extensive organizational culture that embraces sustainability (Papadas and Avlonitis, 2015; Zaid *et al.*, 2018). Such initiatives encompass endeavors to enhance ecological consciousness within the organization with a particular emphasis on fostering employee understanding and engagement with the organization's environmentally sustainable strategies and the implementation of green HRM practices (Dumont *et al.*, 2017; Longoni *et al.*, 2018; Paulet *et al.*, 2021; Renwick *et al.*, 2013). Improved ecological cognizance and training throughout the organization can lead to more favorable outcomes (Kim *et al.*, 2019). GIM suggests that organizations ought to synchronize green marketing strategies with the conduct of their personnel, who bear the responsibility of carrying out the marketing operations of the businesses.

Furthermore, green human capital pertains to developing employees' capabilities, including knowledge, skills and innovation, so that they can efficiently contribute to achieving organizational goals associated with environmental conservation (Kim *et al.*, 2019). Fostering a robust ecological culture can potentially enhance organizations' environmental marketing strategies, leading to positive organization's overall performance results (Fraj *et al.*, 2011; Sathasivam *et al.*, 2021; Zaid *et al.*, 2018). By incorporating ecological knowledge and fostering an environmentally friendly organizational culture, workers are motivated to enhance their skills and capabilities to effectively implement ecological strategies (D'Souza *et al.*, 2015; McDonagh and Prothero, 2014). Given the extensive findings in management research that highlight the importance of using context-dependent scales, it is critical to acknowledge the scarcity of studies focused on developing measures tailored to specific contexts. This contextual gap underlines the need for a targeted approach in creating metrics that accurately reflect the nuances of different environments. It is important to assess the landscape of research on GIM critically. Although Papadas *et al.*(2019) and Qureshi and Mehraj (2022) have explored the notion in a unidimensional context, there is no multidimensional measurement tool for GIM.

This gap in research highlights a significant oversight and raises concerns about the depth and breadth of authors' understanding of GIM specifically in the knowledge-intensive (higher education) industry. The essential to question why exploratory tools have remained surprisingly narrow despite the apparent complexity and multifaceted nature of GIM in knowledge-intensive industry. The absence of a comprehensive, multidimensional approach to measuring GIM limits the potential for nuanced insights and hinders the development of a more robust theoretical and practical understanding of the phenomenon.

2.2 Green internal marketing and knowledge worker performance

Knowledge worker performance is referred to as the degree of productivity displayed by an employee compared to their colleagues across numerous job-related behavioral outcomes (Sahibzada *et al.*, 2019). Implementing GIM strategies is noteworthy in enhancing various aspects of organizational sustainability. These strategies encompass green communication within an organization, green development and training, green incentives, green work support and green service scape (Qureshi and Mehraj, 2022; Sahibzada *et al.*, 2019). Studies have confirmed the effectiveness of environmental awareness education and training programs in improving employees' comprehension of green strategies and their capacity to implement environmental initiatives successfully (Kim *et al.*, 2019). Research has indicated that when employees possess the appropriate knowledge and abilities, they are more capable of contributing to environmental objectives; this can potentially result in enhanced task performance among knowledge workers (Sahibzada *et al.*, 2019). Organizations that strongly emphasize internal green marketing have been observed to display more effective waste management, resource utilization and cost reduction, all of which led to improved performance in task completion (Ali, 2021; Dumont *et al.*, 2017).

Internal green marketing initiatives play a substantial role in influencing contextual performance. Contextual performance refers to the behaviors demonstrated by employees that contribute to the overall effectiveness of HEIs (Al-Alawneh *et al.*, 2024). An organization with a robust environmental culture motivates employees to participate in eco-friendly actions beyond their assigned job responsibilities (Sahibzada *et al.*, 2019). Knowledge workers are more cognizant of their environmental responsibilities and actively engage in efforts to promote sustainability initiatives (Ali, 2021; Dumont *et al.*, 2017). They engage proactively in ecological decision-making processes, cooperate with colleagues to devise inventive solutions and willingly adopt green practices (Kim *et al.*, 2019). The contextual performance behaviors of these knowledge workers not only support the organization's environmental objectives but also improve the overall efficacy of the organization (Kim *et al.*, 2019):

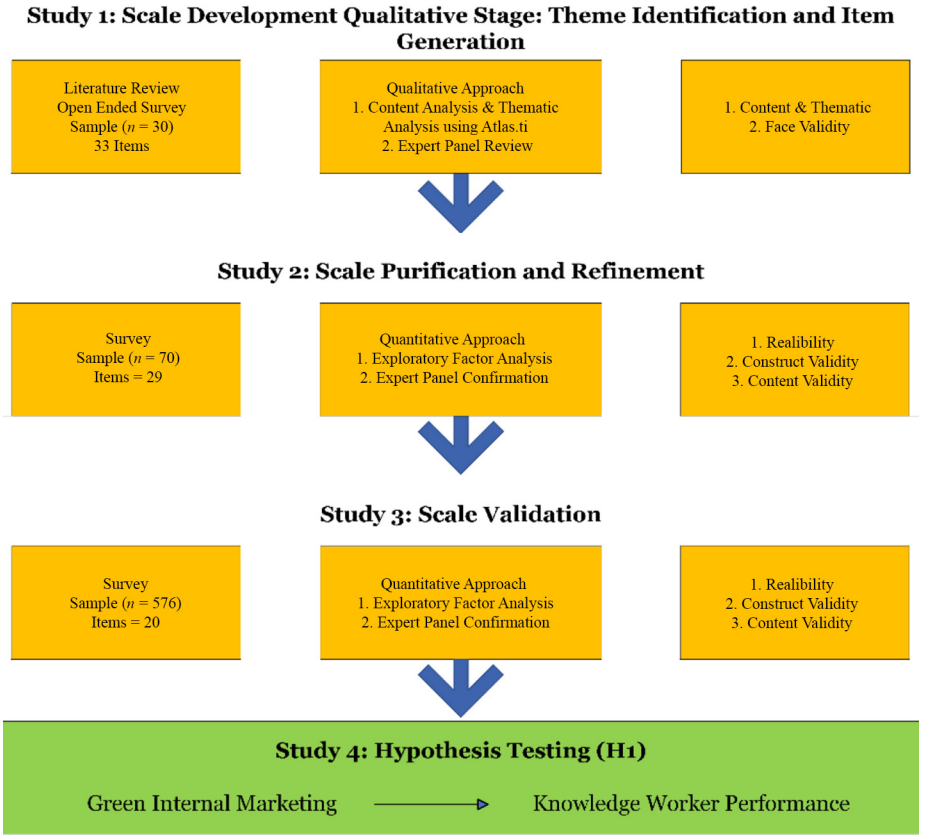
H1. GIM has a substantial impact on knowledge worker performance.

3. Research methodology

3.1 Scale development of green internal marketing

This study aims to provide a measurement tool that can assess GIM in the specific context of higher education. The GIM scale was developed by incorporating four different phases (Figure 1):

(1) Qualitative phase of scale development: identifying themes and generating items.
(2) Phase of scale purification and refinement.
(3) Phase of scale validation.
(4) Hypotheses testing.



Source: Authors' own work

Figure 1. Methodological process used in developing and validating the GIM scale

3.1.1 Study 1 − Scale development qualitative stage − theme identification and item generation. The preliminary phase of scale development consists of the generation of items, a crucial process for establishing accurate measures (Hinkin, 1995). To accomplish this phase and ascertain the recurrent themes, this study adhered to the recommendations put forth by Grant and Davis (1997). The current literature and information gathered through open-ended surveys and written interviews were used as a guiding framework for these recommendations.

3.1.1.1 Data collection and sampling (qualitative study). The objective of this phase was to collect qualitative data to obtain a profound understanding of the perspectives of academics toward GIM and their experiences within higher education settings. A convergent interviewing strategy was used to gather the required information (Carson *et al.*, 2001). This methodology proves valuable during the initial phases of research as it allows us to gain insights and identify significant issues that hold relevance for the specific sample population. The researchers describe this procedure as a recurring sequence of comprehensive interviews, wherein an

unstructured approach is used. The researchers start the interviews by posing general, open-ended inquiries. The authors conducted an extensive literature review on existing scales of GIM as an initial step. Researchers identified and selected scale items demonstrating consistent usage across multiple scales during this process. Subsequently, in-depth interviews were undertaken with a panel of five academic experts (three males and two females) (see Table 1). These interviews aimed to assess the importance of the existing GIM scale items and generate ideas regarding the potential addition of scale items to the GIM measuring instrument for the higher education sector. After multiple iterations, the interviewers refined their questions to ensure they were specifically tailored to investigate the research phenomenon. In May 2023, a panel of 30 respondents consisting of professors, associate professors and assistant professors from Italian HEIs was carefully selected through LinkedIn. The individuals were presented with a survey form that had an open-ended question of GIM (see Table 2). During these extensive interviews, participants were primarily prompted to express their thoughts on several aspects of GIM. The responders were asked five open-ended questions:

Q1. What is your definition of GIM in the context of higher education?

Q2. What strategies can the institution employ to promote green internal marketing?

Q3. In your opinion, what are the primary attributes of GIM in higher education?

Q4. What measures do you believe your university is implementing to promote GIM?

Table 1. Item review panel experts

No.	Position	Degree	Affiliation	Research field
1	Full professor	PhD	University of Bergamo	Organizational behavior
2	Full professor	PhD	University of Bologna	Marketing
3	Associate professor	PhD	University of Bergamo	Higher education
4	Associate professor	PhD	University of Bologna	Green human resource management
5	Assistant professor	PhD	University of Bologna	Marketing

Source: Authors' own work

Table 2. Profile of respondents from LinkedIn

Respondents	*N*
Level of education	
PhD	23
Master's	7
Department	
Management Sciences and Engineering	13
Production and Operations	4
Marketing Department	8
Supply and Chain	3
School of Hospitality and Tourism	2
Gender	
Male	19
Female	11

Source: Authors' own work

Q5. What measures should a university implement to ensure it is at the forefront of GIM initiatives?

3.1.1.2 Qualitative data analysis. The data obtained reached approximately 5,000 words. The data underwent content analysis using the Atlas.ti, following a thorough accuracy check. The initial step involved conducting a thematic analysis by the guidelines provided by Atlast.ti. This analysis aimed to yield a preliminary coding set and manual. The interviews covered a diverse range of dimensions due to the polarizing nature of the research topic, specifically the contrasting perspectives of academics and the environment. The subsequent step in the qualitative data analysis involved coding and further refining the amalgamated themes. After the nodes were identified, themes were generated. Afterwards, identical nodes were eliminated or coupled to achieve the final nodes. In the last stage, themes were determined, and their consistent dimensions to produce the primary set of items, as advised by Crabtree (1999).

3.1.1.3 Results from qualitative data analysis. The content analysis yielded five themes associated with GIM, resulting in 37 items. The next step involved the refinement of the items by a subject matter specialist to ascertain face validity and content validity (DeVellis and Thorpe, 2016). The panel review identified several concerns regarding content ambiguity, lack of relevance and redundancy (Kim *et al.*, 2019). Consequently, nine items were eliminated, leaving 29 for additional analysis.

3.1.2 Study 2 − Scale purification and refinement stage. Study 2 aimed to expand on the results of Study 1 by assessing the set of 29 questions to increase and refine the pool of items, provided that statistical (reliability and validity) and psychometric conditions were not met.

3.1.2.1 Pilot study data collection and sampling. Open-ended interviews offer participants the chance to furnish thorough and superior-quality data, rendering it an exceptionally efficacious approach for attaining insights into the subject matter. In August 2023, using LinkedIn as the platform, we used purposive sampling to choose 70 respondents from the Italian higher education sector, specifically professors, associate professors and assistant professors, for the pilot study. The individuals were presented with a survey form containing inquiries about GIM. The survey results indicated that 53% of the participants were male, while 47% were female. The selection of universities for the pilot study was limited to those in Italy, specifically focusing on five prestigious institutions that the Italian Ministry of Higher Education has recognized for their implementation of environmentally sustainable practices (Civera and Meoli, 2023). Please refer to Table 3.

3.1.2.2 Pilot study data analysis and results. After collecting and refining the data, the researchers proceeded to estimate the construction of the scale and its psychometric qualities. The objective of this study was to ascertain the validity and reliability of the newly developed multidimensional instrument designed to evaluate GIM in HEIs. Using an exploratory factor analysis (EFA) using principal component analysis and varimax rotation constituted the primary phase of this process. This analysis was carried out using the statistical software IBM SPSS 27. EFA has been used in various studies on scale development as an initial phase to validate the dimensional configuration of the scales (Latif *et al.*, 2019). The minimal criteria for factor loadings were established at a threshold of 0.50.

A comprehensive set of 29 items underwent EFA. The factor solution yielded five GIM factors that were categorized during the item generation phase. The factors considered were responsible for 73.39% of the variability. To examine the dimensions of the GIM factor loadings derived from the EFA were subsequently used to remove any items that exhibited subpar performance. The initial factor structure exhibited several items that were not successfully loaded onto their designated factors and instead demonstrated cross-loading

Table 3. Profile of respondents for the pilot study

Respondents	*N*
Gender	
Male	37
Female	33
Qualification	
PhD	40
MS	30
Institution	
University of Bologna	14
University of Bergamo	14
Polytechnico Di Torino	14
Polytechnic University of Milan	14
University of Turin	14
Tenure	
1–5	30
6–10	19
11–15	11
16–20	10

Source: Authors' own work

onto alternative factors. Furthermore, several items experienced significant loading failures on their corresponding factor, with a loading value below 0.50. During the EFA phase, nine items were removed.

After excluding items that were not adequately loaded onto their designated factors and items that did not exhibit cross-loading on other factors, the residual items were again exposed to the factor analysis. The EFA necessitates the fulfillment of several assumptions. First and foremost, it is crucial to assess whether the data matrix exhibits adequate correlations. Upon visualizing the correlation matrix, it was observed that nearly all the correlations exhibited statistical significance at a level of $p < 0.001$. This finding establishes a strong foundation for conducting factor analysis. After analyzing the correlation matrix, Bartlett's test of sphericity was used to determine the overall significance of the correlation matrix. This test offers a statistical measure to determine the likelihood of significant correlations within the correlation matrix of its components. The statistical significance of the results [$\chi 2(n = 70) = 921.442$, $p < 0.001$)] suggests that the data is appropriate for factor analysis. The Kaiser−Meyer−Olkin measure of sampling adequacy was calculated to assess the suitability of the data for factor analysis. The resulting value obtained was 0.847. The analysis resulted in a factor solution that consisted of six factors for the scale. These factors collectively explained 69.471% of the variation observed in the data. The findings of the EFA, including the factor name, statements and loadings, are presented in Table 4.

3.1.3 Study 3: Scale validation stage. 3.1.3.1 Final study data collection. The questionnaire was distributed to respondents from 17 HEIs in Italy. The survey was conducted in English. Data was obtained online from the Italian HEIs using the convenience sampling method. A briefing regarding the study was provided to the deans and heads of departments. Moreover, they were requested to authorize the dispersal of surveys among the faculty. This study specifically chose faculty members from major Italian institutions already involved in

Table 4. Results of the exploratory factor analysis (EFA)

Statement (s)	Codes	Rotated component matrix 1	2	3	4	5
Our university offers employees a green vision that we believe in	GIC1	0.812				
Our university's green vision is well communicated to all employees	GIC2	0.790				
Our university places considerable emphasis on communication about green practices with employees	GIC4	0.741				
Our university encourages employees to express a diversity of opinions about the green strategies of the university	GIC5	0.754				
Our university's green internal communication helps keep employees motivated and engaged at work	GIC6	0.773				
If employees have special needs, our university provides flexible measures and assistance to implement the environmental program	GWS1		0.591			
My supervisor supports me and tries to deal with my obstacles while implementing our university environmental program	GWS2		0.742			
I feel that our university does have enough human resources to implement its environmental program	GWS3		0.792			
Our university enhances my feelings of self-efficiency in implementing an environmental program	GWS4		0.740			
I don't feel that the environment of our offices is noisy and is affecting the work	GWS5		0.819			
I feel that the work division of employees is appropriate or fair for implementing our university environmental program	GWS6		0.637			
Our university compensation system recognizes and rewards contributions to environmental protection	GR1			0.675		
Our university continually rewards those employees who promote eco-friendly behavior	GR3			0.718		
Our university encourages employees to use eco-friendly products/services	GR6			0.681		
Our university delivers training to improve employees' awareness, skills, and know-how about environmental management	GTD1				0.681	
Our university uses environmental protection elements as the central themes of green knowledge development for employees	GTD2				0.831	
Our university views the development of environmental knowledge and skills in employees as an investment rather than a cost	GTD3				0.730	
Our offices for academicians (faculty) are generally clean	GSS1					0.845
The natural lighting and air circulation in our office are good	GSS2					0.802
Our office has creative, colorful designs and quirky spaces with a modern office setup	GSS3					0.641

Source: Authors' own work

environmentally friendly practices as the sample group for the final analysis. We effectively cultivated connections and relationships with influential university opinion leaders. This factor significantly contributed to the subjects' motivation to engage actively in the research. Furthermore, confidentiality of the information has been given priority during data collection. As a result, the study encompassed a total of 585 participants who actively participated and satisfactorily fulfilled the survey questionnaire. The online questionnaire link was subsequently distributed to the participants. Around 9 of the 576 surveys were removed due to significant missing data. For the final data analysis, the total number of samples used was 576 questionnaires.

3.1.3.2 Final study data analysis and results. Data normality test. Following data screening, we performed a data normality test through the skewness, kurtosis and the Shapiro–Wilk test. A subsequent examination of the multicollinearity (VIFs) of the constructs was conducted. A standard data distribution requires skewness and kurtosis values between −2 and +2 (Gravetter and Wallnau, 2014). Similarly, in the Shapiro–Wilk test, the value for each variable should be insignificant, that is, significance or *p*-value >0.05 for normally distributed data. The results of this study showed that skewness and Kurtosis values for all variables were within the recommended range. Likewise, the Shapiro–Wilk test results further strengthen the findings by showing significant values for all the variables. The results of the tests showed that the data in this study were normally distributed. By following the recommendation of Diamantopoulos *et al.* (2008), the multicollinearity of the constructs was established through VIF values, stating that neither construct has a multicollinearity issue as all values are less than 5 (F. Hair *et al.*, 2014).

To evaluate the validity and reliability of the measurement scale and confirmatory analysis, Smart-PLS 4.0 was used. Cronbach's alpha coefficients were above the threshold level (see Table 5), suggesting that the measures' internal consistency and reliability were satisfactory. To evaluate the convergent validity, item loadings were used. All the item loadings observed in Study 3 were statistically significant (see Table 5). These results propose that there is sufficient evidence of convergent validity. Furthermore, it is worth noting that according to the data, the composite reliability and rho_A scores for all six constructs exceeded the established threshold value of 0.7. In addition, the presence of discriminant validity HTMT values was below the 0.85 threshold suggested by F. Hair *et al.* (2017), further supporting discriminant validity (see Table 6). Therefore, Study 3 has substantiated the validity and reliability of GIM as a measuring instrument.

3.1.3.3 Predictive validity. The model included an additional variable, specifically knowledge worker performance, to assess the scale's predictive validity in an Italian HEI environment. The existing literature provides evidence that GIM positively impacts workers' performance (Milanović *et al.*, 2023). A total of five indicators for green task performance and five indicators for green contextual performance were derived from the studies conducted by Podsakoff *et al.* (1990) and Williams and Anderson (1991), respectively, to assess the performance of knowledge workers. All loadings in the measurement model surpassed the critical value of 0.7. The study found that all five dimensions of GIM, namely, green internal communication, green training and development, green reward, green work support and green service scape, had a significant impact on the performance of knowledge workers. These dimensions collectively accounted for 69.7% of the total variance in knowledge worker performance. The obtained results confirm the predictive validity of GIM.

3.1.4 Study 4: Hypotheses testing (GIM → KWP). The study encompassed creating and verifying a scale for quantifying GIM and assessing GIM's impact on the productivity of knowledge workers. The findings indicate a substantial influence of GIM on KWP (b = 0.878, t = 67.555, p < 0.001). Therefore, *H1* was substantiated.

Table 5. Results of reliability, validity and convergent validity

Dimensions	Codes	Λ	VIF	α	CR	AVE
Green internal communication	GIC1	0.793	2.34	0.578	0.714	0.648
	GIC2	0.719	2.11			
	GIC4	0.728	1.89			
	GIC5	0.751	2.02			
	GIC6	0.697	1.95			
Green work support	GWS1	0.648	2.21	0.672	0.739	0.504
	GWS2	0.796	1.92			
	GWS3	0.699	2.05			
	GWS4	0.778	1.88			
	GWS5	0.697	2.14	0.619	0.728	0.579
	GWS6	0.736	1.77			
Green rewards	GR1	0.749	2.06			
	GR3	0.748	2.35	0.7	0.816	0.584
	GR6	0.734	2.23			
Green training and development	GTD1	0.748	1.99			
	GTD2	0.649	2.28			
	GTD3	0.718	2.12	0.768	0.844	0.517
Green service scape	GSS1	0.694	2.00			
	GSS2	0.621	1.87			
	GSS3	0.721	2.09			
Knowledge worker performance	CP1	0.781	2.14	0.629	0.802	0.668
Contextual performance						
	CP2	0.605	2.05			
	CP3	0.617	1.93			
	CP4	0.775	2.22			
	CP5	0.649	2.01			
Task performance	TP1	0.649	2.35	0.756	0.837	0.604
	TP2	0.640	2.18			
	TP3	0.678	1.99			
	TP4	0.664	2.09			
	TP5	0.750	2.25			

Source: Authors' own work

Table 6. Discriminant validity (HTMT)

	CP	GIC	GWS	GR	GTC	GSS	TP
CP							
GIC	0.673						
GWS	0.719	0.713					
GR	0.699	0.701	0.799				
GTC	0.684	0.728	0.784	0.726			
GSS	0.671	0.619	0.639	0.785	0.752		
TP	0.549	0.627	0.563	0.609	0.771	0.695	

Notes: **CP = contextual performance; GIC = green internal communication; GWS = green work support; GR = green reward; GTC = green training and development; GSS = green service scape; TP = task performance
Source: Authors' own work

4. Discussion, conclusion and implications

4.1 Discussion

The current study asserts that the measurement scale for the GIM construct ought to encompass a more inclusive framework than currently used in higher education's unidimensional scales. The newly proposed GIM scale has the potential to serve as a critical instrument within knowledge-intensive organizations. According to Bagheri *et al.* (2022), management needs to engage in regular and personal communication with employees. In the higher education sector, the transmission of knowledge can be a determining factor in enhancing service quality (Latif *et al.*, 2019). The organization's ability to generate, disseminate and respond to information is vital to higher education. Using such capabilities in internal and external markets demonstrates the organization's commitment to prioritizing stakeholders' demands (Bagheri *et al.*, 2022). Comprehending the gathered facts will enable the organization to develop suitable strategies for the internal market (Sahibzada *et al.*, 2019). The successful implementation of GIM requires the organization to make a concerted effort to identify the needs and desires of its employees, evaluate the competitive environment and use this information to design positions that possess the appropriate attributes, with the ultimate goal of maximizing employee satisfaction (Lings and Greenley, 2010).

According to our research, five factors comprise the multidimensional construct that comprises academicians' perception of HEIs GIM:

(1) Green internal communications.
(2) Green training and development.
(3) Green rewards.
(4) Green work support.
(5) Green service scape.

First, the research has found that green internal communications play a significant role in determining HE. The rise of green internal communication underscores its significance for academics in effectively delivering teaching and administrative services to students, who are considered external clients for HEIs. The measuring dimension and its constituent items are similar to previous research findings (Ahmed and Rafiq, 2003; Kaur and Sharma, 2015; Sahibzada *et al.*, 2019). Academics are crucial in creating and maintaining the intellectual resources needed to produce high-quality work. Integration of internal green communication may enhance the outlook, comprehension and practices of employees (academicians), ensuring better work performance to achieve organizational goals (Bagheri *et al.*, 2022).

Second, the application of green training and development in numerous settings is considered as a dependable and consistent indicator (Ahmed and Rafiq, 2003; Kaur and Sharma, 2015). Data relevant to the perceptions of the working staff regarding green training and development in HEIs can subsequently be used to design focused green training initiatives that address environmental challenges. Furthermore, these training courses within knowledge-intensive organizations have the potential to cultivate networking opportunities, thereby enhancing employees' acquaintance through the exchange of information, expertise and perspectives. Subsequently, it results in the development of organizational inclusive communication system (Bagheri *et al.*, 2022).

The third aspect of the study is green rewards. Rewards ultimately catalyze improved academic achievement in higher education, enhancing knowledge workers performance (Newman *et al.*, 2024). The findings of prior research align with the dimension and the items it contains (Kaur and Sharma, 2015). Academics prefer rewards from HEIs in exchange for improved performance at educational institutions. Universities can substantially enhance

their administration by implementing a green reward and recognition system that encourages the exchange of green knowledge and innovation (Sahibzada *et al.*, 2019).

The inquiry included green work support as its fourth dimension. Academicians often need help with their work in the global contexts and different cultures of HEIs, characterized by supervisory backgrounds. The results of previous research and the dimension and its items are comparable (Sahibzada *et al.*, 2019). The implementation of green work support within HEIs may yield substantial benefits, as evidenced by recent research indicating that this aspect precedes knowledge worker performance (Al-Alawneh *et al.*, 2024).

Built upon the foundational dimensions of Bitner's (service-scape), namely, ambient conditions and spatial layout, this manuscript centers on three environmental factors that appear to influence internal reactions within the higher education industry potentially (Newman, 2007). The services' shape, color, texture, clean environment, layout and aesthetics form a personal space and comfort zone for university workers and academics (Newman, 2007).

Moreover, GIM strategies positively influence the knowledge workers' performance at HEIs. The study findings underscore the significance of gathering and using information regarding the needs and wants of the employees. This information should be readily accessible to the workforce to create value for employees (Kaur and Sharma, 2015). As key determinants of GIM, the identified activities can considerably contribute to identifying employee-related data that can greatly assist in addressing the challenges of contemporary higher education. The study's findings align with earlier research, indicating that GIM strategies can increase worker performance by satisfying internal customers (Sahibzada *et al.*, 2019). Organizations that improve internal dissemination of data using GIM are more receptive to employees, leading to enhanced worker performance, ultimately, greater organizational performance (Al-Alawneh *et al.*, 2024).

4.2 Practical implications

First, the study's findings indicate the importance of fostering open communication between academic and administrative staff regarding environmentally sustainable internal communication practices. This type of communication has a significant impact on the performance of knowledge workers. It heightens environmental consciousness, drives engagement, promotes collaboration, harmonizes institutional and individual objectives and enhances accountability within higher education establishments.

Second, green training and development play a significant role in HEIs. It is recommended for the HEI's professionals to realize the significance of green training and development as a collection of knowledge worker's intangible resource repository that enable them to foster numerous skills and predispositions to augment their performance. Broad networking opportunities is an additional benefit of these training programs in knowledge-intensive organizations (HEIs), which helps in enhancing employees' networks via the exchange of information, proficiency and diverse perceptions, ultimately, resulting in establishing a cohesive organizational communication network (Bagheri *et al.*, 2022).

Third, having a robust reward system should be considered essential to ensure the professional development and motivation of HEI's professionals. Rewards and incentives may serve as a catalyst for enhanced drive and motivation for knowledge workers who dynamically partake in green initiatives in HEIs. Knowledge-intensive organizations with a strong reward system can provoke employees to contribute in green initiatives outside their allocated work assignments. It can be safely stated that motivated employees are cognizant of ecological responsibilities and tend to engage in green initiatives to reassure the organizational goals of attaining sustainability. They take part in green decision-making

processes, collaborate with colleagues to develop innovative solutions, and readily embrace sustainable practices (Kim *et al.*, 2019).

Fourth, the development of a knowledge-sharing and collaborative research culture amongst university academics cannot be undervalued. Employees tend to thrive in a knowledge-sharing culture where they could share their thoughts amenably. The support can take on various forms, including the provision of resources for research, the facilitation of networking opportunities, the provision of incentives for collaborative endeavors and the establishment of platforms for exchanging information. Management fosters interdisciplinary initiatives and shared learning by fostering a positive research climate and promoting open communication, thereby breaking down silos between departments and disciplines. This culminates in a more unified academic community, superior research results and increased innovation.

Finally, employees' work productivity can be influenced by the physical environment with a deliberate structure. Aesthetic features like natural lighting, color palettes and furniture design are central to creating a visually appealing and comfortable work environment, allowing improved concentration and less stress. The allocation of private offices and collaboration places enables a balanced integration of privacy and setting for focused tasks that may also support teamwork. Introducing these features in an institution promotes a congenial environment for not only staff members but also for the academics, making them feel more valued leading to improved work performance and job satisfaction overall.

4.3 Conclusion

The study focused on creating a multidimensional GIM measurement scale for HEIs. The study used a literature review and focus group discussions to gather information on GIM. The scale has demonstrated reliability and validity as an instrument for quantifying the perception of GIM in HEI. In addition, this investigation examined the influence of GIM on academics and found that GIM had a substantial effect on academic performance. This suggests that educational institutions prioritizing GIM initiatives have the potential to enhance their academic performance, thereby leading to improved organizational performance.

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Corresponding author
Michele Meoli can be contacted at: michele.meoli@unibg.it