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Sustainability policies adoption within Italian Michelin-starred restaurants: From external drivers to costs

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Abstract

The purpose of the research is to investigate the increasing importance of the role of sustainability in high-end restaurants, specifically in those awarded Michelin stars. The focus is on the role sustainability plays as a crucial element in the state-of-the-art of fine-dining business given that restaurants are challenged to reconsider the noteworthiness of new sustainable imperatives. The study is based on a questionnaire survey carried out with over 70 owners and chefs from Italian Michelin-starred restaurants. The results show a clear tendency towards sustainability and an increasing attention towards this trend, emphasizing its peculiarities for the restaurant industry, which is indicates profound changes. More specifically, 35% of the variance in internal sustainability policies adoption is explained by external drives related to sustainability and customers' demands of sustainability. The data collected relies on an Italian sample, but the results are useful to understand the sustainability imperatives for the Michelin-stars restaurants worldwide as the Italian food service industry is often deemed as iconic. The study advances new insights into the future of the sustainable restaurant industry. The results of research are based on a novel research design and empirical survey capturing the state-of-the-art of sustainability policies adoption in the case of Michelin-starred restaurants.

KEYWORDS
Michelin stars, restaurant industry, sustainability, sustainable development

1 | INTRODUCTION

The importance of food in Italy has been long acknowledged from at least two points of view, that is economic—with the agri-food sector being Italy's biggest industry and the country being third in Europe in terms of the value of production (Istat, 2021) and cultural point of view—given that many of the Italian traditions and habits revolve around food or have food as a fundamental part of them (Sproesser et al., 2022). In this respect, the example of the Christmas tradition is eloquent, with its typical Panettone and all the different typical dishes which are very much an integral element of the festivities and the regional identity of people. Therefore, it is easy to understand why restaurants play such an important role in the Italian society, as a gathering place and an asset for the economy. The restaurant industry arises as a crucial sector, with a pre-Covid annual revenue of 85.3 billion euros and more than 1 million and 200 thousand people employed (Sbraga, 2021). Moreover, out-of-home food consumption has accounted for around 36% of total food consumption in the country, positioning the Italian restaurant market as the second largest in Europe, after Spain (PWC, 2018).

In this context, the restaurant industry is the object of many changes and evolutions related to societal, ecological, and economic transformations, the sustainability imperatives emerging as a novel

framework for the development of the entire food sector. The topic of sustainability is one of the main contemporary issues, and over the years all its complexities have developed, due to the intrinsic multidisciplinarity of sustainability (Ferioli et al., 2022; Gazzola et al., 2019; Soto-Acosta et al., 2016; Vătămănescu et al., 2016, 2017, 2021).

In this front, an important goal would be to propose a new perspective on today's restaurant industry, which is strongly influenced by the ever-increasing noteworthiness of sustainability, both from an ecological and social point of view. An evocative example in this sense is the latest introduction of the new symbol the Green Michelin Star in the specialized Guide: The green clover first made its appearance in 2020 and was then included in several 2021 editions of the Guide published all over the world. Awarded every year, the Michelin Green Star honors restaurants that are setting the standard for sustainability in the food service sector (Huang et al., 2023). In order to prevent waste and minimize plastic and other non-recyclable materials from their supply chain, they hold themselves accountable for both their ethical and environmental standards and collaborate with sustainable producers and suppliers. The underlying goal is to reward virtuous actions carried out by contemporary restaurants, which set examples for their peers and serve as inspiration for future generations of food establishments (Park et al., 2020). The decision to create this recent symbol comes from direct observation of Michelin's inspectors, in order to promote a lively and positive dialog within the restaurant industry, to increase consumers awareness of the difficulties facing sustainable development, and to acknowledge the forthcoming challenges which are going to see food and sustainability strongly intertwined (Michelin, 2021).

Still, paying heed to prior developments linking sustainability and the restaurant industry, there are some notable knowledge gaps that need to be addressed (Ju & Hyeja, 2016). For example, there is a lack of research on the long-term impacts and effectiveness of sustainable practices implemented by restaurants. This knowledge gap hinders the understanding of the long-term benefits and outcomes of sustainability initiatives in the restaurant industry (Jang, 2016). Additionally, there is a need for more research on the barriers and challenges faced by restaurants in implementing sustainable practices (Baloğlu et al., 2020; Jacobs & Klosse, 2016). This issue impedes the development of effective strategies and solutions to overcome the existing barriers and alters the promotion of sustainable practices in the restaurant industry. Furthermore, there is limited research on the awareness and perceptions of customers towards sustainable practices in restaurants (Ju & Hyeja, 2016). Delving into these aspects would catalyze the understanding of the impact of customer preferences and behaviors on the adoption and success of sustainable practices in the restaurant industry.

Consequently, giving credit to the existing knowledge gaps, the purpose of this paper is to investigate the role of sustainability as a driving force within the food industry. More specifically, the aim of the research is to determine to what extent do the external drivers related to sustainability and the customers' demands of sustainability influence the internal sustainability policies adoption and to what extent the latter impacts the costs derived from sustainability policies adoption. The targeted population were restaurant managers and chefs from Michelin-recognized Italian restaurants as key informants for the high-quality standards in the gastronomic industry. Over 70 key informants filled in the questionnaire-based survey, thus engendering good premises to investigate the inferred relationships among the constructs.

Against the backdrop of the sustainability—restaurant industry dyad, the current scrutiny focuses on the Italian territory, pointing to how the Michelin Guide has become the reference point for eating out and especially for fine dining, and how the introduction of the Green Star is an excellent signal of the rising importance of sustainability for the future of restaurants (Gazzola et al., 2023). The Michelin stars award is hereby deemed as a milestone for high quality restaurants (Hayward, 2021). As a matter of fact, no other food guide is as authoritative as the Michelin Guide and its stars; on the one hand, it is well known that earning one or more stars attracts the public, because of the given prestige and exposure, resulting in a considerable increase in the turnover after being inserted in the red book, moreover they are able to improve their staff, since highly skilled workers are more prone to apply for locations with a distinguished reputation. On the other hand, losing a star means a strong reduction in customers and a delicate moment for the restaurant's public image. The pressure on the chef and the staff of a Michelin-starred restaurant is therefore consistent, at the beginning for capturing the inspectors' interest and having a chance at entering among the appointed and then for preserving the acknowledgment while at the same time trying to innovate and elevate the experience for the customers. Despite the controversies behind the Michelin Guide, Michelin has long been the leader of the field in Europe for many years (Bouty et al., 2013). It represents, for the majority of the 28 countries and cities in which it is published, the benchmark for high-quality dining, that is, to say for excellence in the global restaurant industry.

Following this line of reasoning, the paper was organized into several main sections. Firstly, the contextual framework is described followed by the hypotheses development. Then, the research design and methodological approach are introduced. Thirdly, the results and their discussion are developed, the study ending with the conclusions and inherent implications.

2 | LITERATURE REVIEW

2.1 | Contextual framework from a sustainability perspective

On March 20, 1987, the Brundtland Commission of the United Nations advanced sustainability as a constituent part of the concept of *sustainable development*. The UN Document "Our Common Future" defined sustainable development as the "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland, 1987). Although the Brundtland Report's definition offers an insightful viewpoint on sustainable development, it has a number of limitations, as the definition seems to treat the different aspects involved as secondary to economic growth. Sustainability has proven to be substantively about

ensuring that people can survive, satisfy their needs, and prosper on the earth, generation after generation (Hapenciuc et al., 2015; Păduraru et al., 2016; Vătămănescu et al., 2017, 2018, 2021; Zamfir et al., 2023). It would be therefore possible to state that sustainability is a term coined by individuals to help advance human welfare (Fuchs et al., 2021).

However, reaching this conclusion and level of awareness has required a long process over many decades. By the middle of the 20th century, concerns regarding environmental degradation started to arise (MacGregor Pelikánová & Sani, 2023; Ogutu et al., 2023). Meadows et al. (2013)—considered the head author of the book "The Limits of Growth" (1972)—sparked a discussion about the limits of Earth's ability to sustain human economic expansion, which garnered international attention and is still being discussed today. The focus of this debate is the necessity to bring back the connection between humans and the planet they live in (Raworth, 2012).

The concepts of interconnectedness and complexity of ever-happening changes are taken from Ecology. This subject began only considering natural phenomena but soon got interested in humankind, as ecologists realized that it was almost impossible not to find human influence in every system they were studying. Modern ecological sciences aim to study the interconnectivity of various forms of life, the environments, and all living organs globally and in a systemic paradigm (Capra & Luisi, 2014). Ecology is therefore best understood as the sensitivity to consider these connections and relationships in any action humans may take to better their own circumstances. Undoubtedly, the process of intertwining ecology and development has been a challenging process which further resulted in the 17 sustainable development goals (SDGs), embraced by the United Nations (UN) in 2015. These goals provide a "shared blueprint for peace and prosperity for people and the planet, both now and in the future". The final intention of the 17 SDGs is thus to create a loop of positive processes, deriving from the actions necessary to reach objectives. In addition, the SDGs provide a framework of principles within which development can be properly handled, while still being considered sustainable (Gazzola et al., 2020).

Alongside the environmental point of view, it is fundamental to discuss the social side of sustainability. Due to the advancement of studies in the field of sustainability, in addition to environmental conservation and ecological practices, the social aspect of sustainability has been added as a fundamental element of sustainable development (Gazzola et al., 2019; Małys, 2023; Vătămănescu et al., 2021). Social sustainability refers to the set of formal and informal practices within processes, structures, and systems that create the right conditions for future and present generations to create healthy communities with a good quality of life (Grum & Kobal Grum, 2020; Peña et al., 2023). The objective is therefore to create a society that is liveable, fair among all its members, democratic, and inclusive of all the diversity within it (Gazzola & Pellicelli, 2019; Sharma et al., 2023).

From a bird's eye view, the adoption of sustainable practices in the restaurant sector has been a continuously developing area of interest. However, there are certain areas of research and application that require attention and resolution. On the one hand, there is insufficient data on the enduring ramifications of implementing sustainable practices in the restaurant industry. Although certain studies may examine the immediate advantages, more thorough research is needed to assess the long-lasting impacts on the environment, corporate profitability, and customer loyalty (Jang, 2016). On the other hand, deeper investigation is required to pinpoint the impediments that hinder restaurants from embracing sustainable practices. Although cost is a prominent consideration, as it frequently necessitates investment in novel technologies or methodologies, it is crucial to comprehend the complete array of impediments, such as management attitudes or supply chain constraints, to formulate comprehensive plans (Baloğlu et al., 2020). Furthermore, novel research is required to delve into customer views regarding sustainability in the restaurant sector. This entails assessing the level of customer awareness regarding sustainable practices and its impact on their dining preferences, along with evaluating the efficacy of marketing and educational initiatives targeted at promoting sustainable behaviors among consumers (Gallardo Vázquez, 2023; Jang, 2016). By addressing these deficiencies, the sector can establish a more explicit plan to achieve sustainability goals, while simultaneously meeting customer demands and economic targets.

By taking stock of these facets, the contemporary restaurant sector will be significantly shaped by the growing significance of sustainability, encompassing ecological and social dimensions. As showcased by Huang et al. (2023), the Michelin Green Star is an annual accolade bestowed upon restaurants that demonstrate exemplary sustainable practices within the food service industry. Pursuant to Park et al. (2020), the primary objective is to provide recognition for commendable behaviors exhibited by present-day restaurants, so establishing benchmarks for their counterparts and serving as a source of motivation for future generations of food outlets. Simultaneously, the goal is to enhance consumer consciousness regarding the challenges associated with sustainable development and recognize the imminent intertwining of food and sustainability as they face forthcoming challenges (Michelin, 2021). The implementation of sustainable practices in Michelin-rated restaurants has the potential to foster the development of robust and thriving communities, as well as promote a fair and just food system on a broader scale. Furthermore, these practices have the capacity to instigate societal transformations that extend beyond the confines of the restaurants in question.

2.2 | Hypotheses development

In recent years, there has been a growing emphasis on sustainability trends and their impact on customer preferences within the food service sector. Today's consumers are well-informed about environmental issues and as a result, place significant value on sustainable practices. This can be observed through the increasing demand for ethically sourced, organic, locally grown, and sustainably produced food items (Cohen, 2022; Deloitte, 2022a).

The food service system has been deeply studied as it provides the perfect example of the complexity of sustainability, yet it has been predominantly approached as an example of linear logic (Gazzola et al., 2022): resources are extracted, processed, consumed, and thrown away as waste. This, however, obviously does not concern itself with the availability of raw material in the long term, but focuses on the quantity produced in the short term. In addition, any waste or the impact of production on society and the environment is not taken into consideration during the process. Given this premise, it comes as no surprise that high-end restaurants all over the world are starting to lay increasing emphasis on sustainability and on its integration into food-related processes. In some studies, the attribute dimensions such as food, service, price, and value, have been positively and directly related to customer satisfaction (Liu & Tse, 2018).

The literature (Baloğlu et al., 2020; Jacobs & Klosse, 2016) identifies several external drivers for sustainability in the restaurant industry. Firstly, there are the customer choices given that consumer preferences are shifting towards more environmentally friendly and sustainable options. Customers increasingly seek out establishments that align with their values, including those that practice sustainability in their operations. Adjointly, other stakeholders such as suppliers and investors have an important role. Suppliers may be drivers of sustainability by providing restaurants with sustainable options, such as locally sourced food or eco-friendly packaging, that make it easier for restaurants to implement sustainable practices whereas investors and shareholders may seek to reduce risk and enhance brand value by encouraging or requiring sustainable practices in restaurant operations. Secondly comes market competition. As sustainability becomes a differentiator in the market, competition can drive restaurants to adopt green practices. This is often a response to competitors' initiatives to attract a share of the eco-conscious customer base. These are complemented by the exiting norms and regulations which compel restaurants to adopt sustainable practices (i.e., waste management, energy efficiency standards, and other environmental regulations that impact restaurant operations; Baloğlu et al., 2020). Finally, restaurant recognition and reputation in the sector can influence restaurant management to adopt sustainability as part of their corporate social responsibility initiatives (i.e., Michelin recognition) (Huang et al., 2023; Park et al., 2020). These external drivers are reflective of broader societal shifts towards recognizing the importance of sustainability for environmental conservation, public health, and long-term economic viability.

Correlatively, Abdou et al. (2023) consider sustainable food practices (SFPs) as a crucial focus area for the restaurant industry connected with the environmental challenges and the increasing concerns around food security. In their study, they investigate the key drivers of promoting SFPs, considering the relevance of customers' behaviors. Furthermore, Tommasetti et al. (2018) evidence that consumers' behavior is affected by attitude, the subjective norm, the perceived behavioral control, the perceived usefulness, and the curiosity. This also implies the likeability of translating external drivers into assumed attitudes and behaviors towards sustainability. Building on this logic, it may be inferred that:

H1. *The external drivers related to sustainability have a positive influence on customers' demands of sustainability.*

Tommasetti et al. (2018) explicitly state that Michelin-rated restaurants are not exempt from the growing demand for sustainability. In fact, many Michelin-rated restaurants have embraced sustainable practices and incorporated them into their operations. These practices can range from sourcing ingredients locally and seasonally to investing in energy-efficient equipment and implementing waste reduction strategies. According to Baloğlu et al. (2020), the internal sustainability policies in restaurants are often focused on changes in operations, management, and culture to reduce the ecological footprint and enhance social responsibility. According to the authors, these internal policies cover multiple layers. To start with, emphasis is laid on implementing practices aimed at reducing energy consumption, such as using energy-efficient appliances, LED lighting, and managing heating and cooling systems more effectively. Water-saving initiatives may also be included, like installing low-flow faucets and toilets. Secondly, in terms of waste reduction and recycling, many restaurants develop policies to minimize food waste, encourage recycling, and manage waste sustainably. This may involve composting organic waste, reducing packaging, and using recyclable or biodegradable materials. Thirdly, restaurants may adopt policies that prioritize purchasing from suppliers who engage in sustainable farming and production practices. This includes sourcing organic, local, and seasonal products to minimize the environmental impact of transportation and support local economies. Fourthly, pursuing sustainability certifications and reporting sustainability performance can be part of a restaurant's internal policy. This provides a framework for setting and achieving sustainability goals, as well as communicating progress to stakeholders. Finally, an innovative management integrating education and training programs for staff on sustainability practices ensure that employees understand the importance of these initiatives and how to properly implement them. Engaging staff in the development of these policies can also enhance commitment and execution. These internal policies are adopted not only for ethical reasons but also because they can lead to cost savings, improved customer perceptions, and potentially new market opportunities (Baloğlu et al., 2020).

In this vein, Salzberg's (2016) study previously investigated the factors influencing restaurant owners' or managers' decisions to adopt sustainable innovations in restaurants, hence demonstrating the need for new policies that effectively increase the rate of sustainability innovation adoption throughout restaurant industry. Huang and Hall (2023) examined the websites of 135 Michelin three-star restaurants by identifying restaurants' sustainable practices during the processes of procurement, preparation, and presentation. Michelin-starred restaurants are significant influencers in the restaurant industry, as well as food fashions overall, and may therefore serve to promote sustainability practices. They found that although all sustainable practices are mentioned by less than half of the reviewed websites, most practices could be interpreted as being embedded in their locality, especially local food and restaurant history. Furthermore, the systematic literature review of Chams and García-Blandón (2019) showed the key role

of external drivers had in the internal acknowledgement of sustainability imperatives by paying heed to the impact of sustainable human resource management on developing workplace sustainability and on the adoption of SDGs. Based on these insights, the second hypothesis of the study was formulated, that is:

> **H2.** *The external drivers related to sustainability exert a positive influence on the internal sustainability policies adoption.*

Diners increasingly seek restaurants that source ingredients sustainably. They are willing to pay a premium for meals made from organic, regionally sourced, and sustainably grown products. This is seen in the demand for farm-to-table dining experiences where ingredients are sourced directly from local farms (National Restaurant Association, 2022). Additionally, waste management practices are important for many customers. They prefer dining establishments that focus on waste reduction, such as those practicing composting or recycling programs (Saeed et al., 2018). Restaurants that integrate energy-saving measures into their operations, such as energy-efficient appliances, or renewable energy usage, often attract more eco-conscious customers (Shishan et al., 2021). Lastly, customers are also interested in the social sustainability of restaurants. This entails fair employee wages, job security, good working conditions, and community involvement. Conflating these arguments, there is a clear trend of customers making conscious choices to support restaurants that align with their values relating to sustainability. This has prompted many establishments, including Michelin-rated restaurants, to undertake various sustainability initiatives.

The research of Raab et al. (2018) discusses what motivates restaurant managers to adopt and implement sustainable practices, simultaneously examining managers' behaviors when facing environmental pressures. The study concludes that restaurant managers are mostly influenced by pressures from their suppliers, customers, and to a lesser extent from their employees and by expectations of society at large.

Another interesting study investigated the current levels of environmental sustainability in restaurants across the U.S. to determine whether a restaurant's proclivity for environmental sustainability depended on its characteristics such as chain affiliation or restaurant type. The research highlights the differences in restaurant environmental sustainability in relation to different type of customers across different restaurant segments (Jang & Zheng, 2020). Further, according to Cho and Yoo (2021), nowadays consumers understand how restaurants impact the environment and they urge the food sector to implement green practices. The success of a restaurant is therefore very connected with the way it meets customer expectations. Following these findings, it may be inferred that:

> **H3.** *Customers' demands of sustainability have a positive influence on the internal sustainability policies adoption.*

The adoption of sustainability practices in restaurants can influence costs in both the short term and long term. Initially, it might lead to increased costs as restaurants invest in energy-efficient equipment, organic or locally sourced produce, and other sustainable initiatives which may have higher upfront costs than conventional methods (Maynard et al., 2020; Tommasetti et al., 2018; Yoon et al., 2020). Energy-efficient appliances, for example, often have higher purchase prices, but can reduce energy costs in the long run. Adopting waste management strategies such as composting or recycling can increase operational costs but can also bring about savings in terms of reduced waste disposal costs.

Similarly, sourcing locally grown or organic produce may require a larger investment due to higher prices compared to non-organic or imported goods. However, these costs could be offset by the potential to charge premium prices for meals made from these ingredients, as many consumers are willing to pay more for sustainable and high-quality food (Deloitte, 2022b). In terms of social sustainability, providing fair wages and good working conditions might increase staff costs, but can lead to improved staff retention, reducing costs associated with hiring and training new personnel. In summary, while adopting sustainable practices can result in initial cost increases, over the long term it can lead to significant savings and even potential profits, as well as attracting a growing market of environmentally conscious consumers.

Nevertheless, many companies perceive implementation and maintenance cost as one of the biggest barriers to implementing environmental strategies. This accentuates the need to identify perceived low-cost environmental strategies that are suitable and effective (Mak & Chang, 2019). Perramon et al. (2014) in their research on Spanish restaurants found that green practices have a strong positive direct influence on operational performance and competitiveness and that they indirectly influence firm performance more than the costs connected with sustainable practices. Furthermore, they suggest that being proactive about sustainability issues gives the restaurants benefits in terms of competitiveness, though increasing costs. Consequently, it may be presumed that:

> **H4.** *The internal sustainability policies adoption has a positive influence on the costs derived from sustainability policies adoption.*

Conflating the abovementioned hypotheses, the following research model was generated (Figure 1).

3 | MATERIALS AND METHODS

3.1 | Data collection and research sample characteristics

The aim of this research was to determine to what extent do the external drivers related to sustainability and customers' demands of sustainability influence the internal sustainability policies adoption

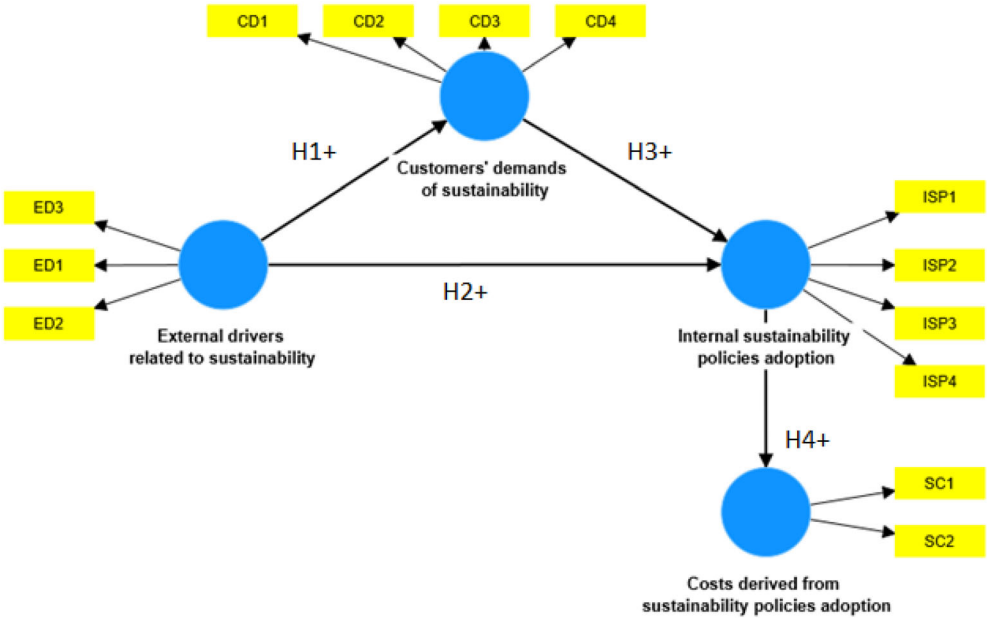

FIGURE 1 Research model.

and to what extent does the latter impact the costs derived from sustainability policies adoption. The targeted population was restaurant managers and chefs from Michelin recognized Italian restaurants as key informants for the high-quality standards in the gastronomic industry. Contacted via e-mail invitations, 90 respondents agreed to participate in the questionnaire-based survey, but only 71 of them (53 male, 12 female, and 6 undeclared) completed the entire research instrument between December 21, 2022 and January 16, 2023. In order to appraise the sample size adequacy, the inverse square root method by Kock and Hadaya (2018) was used. The analysis indicates that 71 respondents are suitable to detect path coefficients between 0.21 and 0.30 with a significance level of 5% and statistical power of 80%.

In terms of the granted Michelin stars, 56 restaurants have a Red star, 3 a Green Star while 12 have both stars. Most of them are in the North-West (21), North-East (19), and Center (18) whereas the rest are located in the South (12). A great majority of the restaurants have been active for more than 20 years (35) while only 17 of them have been active for less than 5 years. Most restaurants (61) have less than 30 employees, only 10 of them exceeding this threshold. The responsibility of sustainability policies adoption mainly falls in the hands of the chef (57) or of the restaurant managers (15), whereas only 2 restaurant holders are in charge of such issues.

When asked what sustainability stands for in their view, most of the subjects (48) responded that it is mainly about the maintenance of ecological processes essential for food production, safeguarding biodiversity in the animal and plant world, protection, and development of ecosystems. The rest of the responses revolved around the development that meets the needs of the present without compromising the ability of future generations to meet their own (14) and Combined contribution to prosperity, environmental quality, and social capital (9).

In order to further test the subjects' comprehension of sustainability policies, they were asked about the innovations introduced or planned to be introduced with a view to becoming more sustainable at an environmental, social, and economic level. In this respect, most of the respondents focused on the purchase of locally produced ingredients and proper waste disposal (separate collection, disposal of special waste and used oil) (over 50 respondents) and on adding vegetarian options and reduction in the use of chemicals (over 30 respondents). Furthermore, when asked about the challenges expected for the future of the restaurants, especially in relation to sustainability, most subjects referred to the protection and enhancement of the territory, its traditions, and its culture (over 50 respondents), circular cooking: use of food products in their entirety, without waste and sustainability education for consumers (over 40 respondents).

3.2 | Method and technique

The study was unfolded through quantitative-based research based on 18-item questionnaires distributed by the authors by means of the Qualtrics platform. Employing structural equation modeling based on partial least squares (PLS-SEM) and the specific application SmartPLS 4.0 (Ringle et al., 2024), the analysis of the conceptual model was performed (see Figure 2). The choice for PLS-SEM was founded on the fact that the technique allows a causal—predictive approach to structural equation modeling by better accounting for prediction in estimating statistical models (Hair et al., 2019; Sarstedt et al., 2023).

In line with the literature (Hair et al., 2022), various assessments regarding the indicators, as well as the considered constructs/dimensions were performed. After assessing the measurement model, the next scrutiny evaluated the structural model.

FIGURE 2 Structural model.

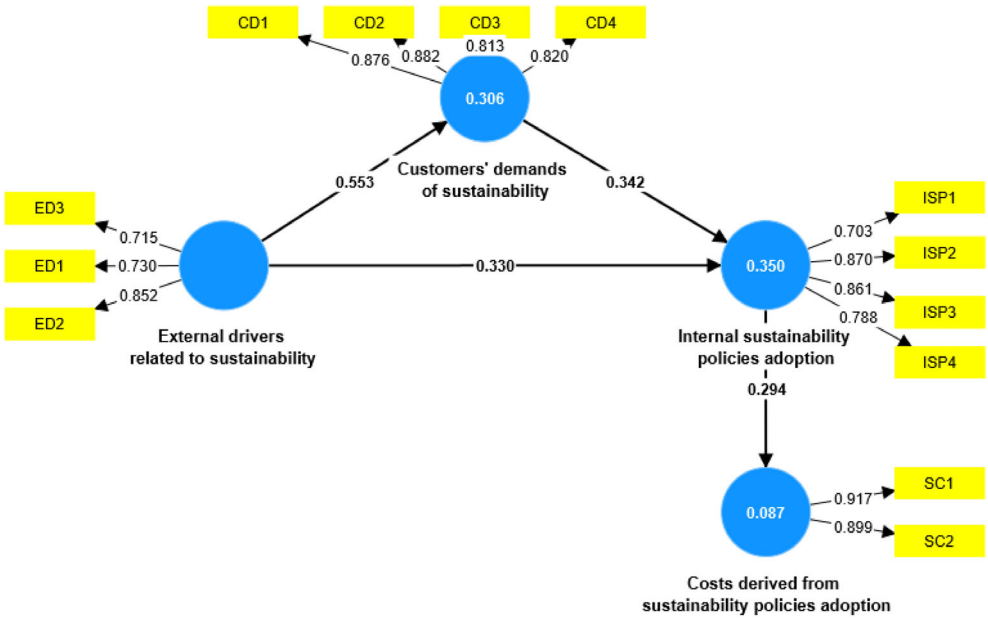

TABLE 1 Constructs: Literature and fit indices.

Item	Construct	Item loading	Cronbach's alpha	AVE	CR
External drivers related to sustainability—adapted from Baloğlu et al. (2020), Gazzola et al. (2022), Jacobs and Klosse (2016), Liu and Tse (2018), and Abdou et al. (2023)					
Reflective construct					
ED1	Growing importance of sustainability in business models	0.730	0.669	0.590	0.735
ED2	Growing importance of customers' choices in terms of sustainability	0.852			
ED3	Recognition of the Michelin Green Star	0.715			
Customers' demands of sustainability—adapted from Salzberg (2016), Huang and Hall (2023), and Chams and García-Blandón (2019)					
Reflective construct					
CD1	Greater transparency on the origin of the products	0.876	0.871	0.720	0.887
CD2	Greater clarity on the choice of suppliers who share sustainable choices	0.882			
CD3	Innovative management of internal human resources	0.813			
CD4	Precautions related to the functioning of the structure (set-up and components)	0.820			
Internal sustainability policies adoption—adapted from Raab et al. (2018), Baloğlu et al. (2020), Jang and Zheng (2020), and Cho and Yoo (2021)					
Reflective construct					
ISP1	Reduction of waste production and proper disposal	0.703	0.824	0.653	0.857
ISP2	Transparent communication of the sustainable practices implemented	0.870			
ISP3	Research and use of sustainable fittings and components	0.861			
ISP4	Innovative human resource management	0.788			
Costs derived from sustainability policies adoption—adapted from Mak and Chang (2019) and Perramon et al. (2014)					
Reflective construct					
SC1	Internal company costs	0.917	0.788	0.825	0.793
SC2	Final cost to the customer	0.899			

Note: Factor loading >0.6; Cronbach's Alpha >0.65; Average variance extracted (AVE) >0.5; Composite reliability >0.7.
Source: Own development based on the literature. The statements were adapted to fit the purpose of this research.

3.3 | Measures

The advanced model integrates four constructs as follows: External drivers related to sustainability (comprising 3 indicators), Customers' demands of sustainability (comprising 4 indicators), Internal sustainability policies adoption (comprising 4 indicators), and Costs derived from sustainability policies adoption (comprising 2 indicators). All constructs were designed as reflective as their indicators are descriptive of various facets of the latent variables. The composition of each construct and its indicators are illustrated in Table 1 which also introduces the main references considered for the development of the scales. All indicators were measured on a Likert scale ranging from 1 to 5 (1 = very little and 5 = extremely). In this vein, the items were adapted to a certain extent to better fit the current research framework.

4 | FINDINGS

4.1 | The evaluation of the measurement model

The first step of the measurement model assessment relied on evaluating data validity and reliability using Cronbach Alpha, Average Variance Extracted, and the Composite Reliability. All the thresholds meet the recommended values; hence the constructs probe convergent validity (Chin, 1998; Hair et al., 2019, 2022) (as seen in Table 1).

Further, the item loadings and the variance inflation factors were scrutinized. Table 2 illustrates the discriminant validity based on Fornell-Larcker criterion while Table 3 presents the data on the HTMT_Inference results derived from HTMT bootstrapping procedure with 10,000 subsamples (Franke & Sarstedt, 2019; Ringle et al., 2023). As advanced by Franke and Sarstedt (2019), HTMT values which are below the critical threshold of 0.9 are indicative of discriminant validity (as reported in the upper bound of Confidence intervals bias corrected). As seen below, all the values comply with the recommended minimum and/or maximum thresholds, therefore the constructs can be considered as such (Hair et al., 2022; Ringle et al., 2023).

In the case of both discriminant validity analyses (see Table 2—Fornell–Larcker criterion and Table 3—HTMT_inference), the recommended thresholds are fulfilled (Ringle et al., 2023), so further examinations were conducted in terms of the structural model assessment.

4.2 | The evaluation of the structural model and discussion of the results

As recommended by the literature (Becker et al., 2023; Sarstedt et al., 2023), the variance inflation factors (VIF) were computed. The

TABLE 2 Discriminant validity analyses (Fornell-Larcker).

	Costs derived from sustainability policies adoption	Customers' demands of sustainability	External drivers related to sustainability	Internal sustainability policies adoption
Costs derived from sustainability policies adoption	0.908			
Customers' demands of sustainability	0.191	0.848		
External drivers related to sustainability	0.196	0.553	0.768	
Internal sustainability policies adoption	0.294	0.524	0.519	0.808

TABLE 3 Heterotrait-Monotrait ratio (HTMT)—Confidence intervals bias corrected.

	Original sample (O)	Sample mean (M)	Bias	5.00%	95.00%
Customers' demands of sustainability ↔ Costs derived from sustainability policies adoption	0.234	0.288	0.053	0.1	0.348
External drivers related to sustainability ↔ Costs derived from sustainability policies adoption	0.272	0.352	0.08	0.102	0.496
External drivers related to sustainability ↔ Customers' demands of sustainability	0.629	0.649	0.019	0.465	0.784
Internal sustainability policies adoption ↔ Costs derived from sustainability policies adoption	0.364	0.393	0.029	0.199	0.568
Internal sustainability policies adoption ↔ Customers' demands of sustainability	0.583	0.606	0.023	0.349	0.768
Internal sustainability policies adoption ↔ External drivers related to sustainability	0.673	0.699	0.026	0.404	0.897

highest VIF value for the inner model is 1.440 (thus less than 3), therefore multicollinearity does not represent an issue for the sample. To test the relationships between the constructs, a bootstrap analysis was performed, based on t-statistics, which allowed us to accept all the hypotheses. The explanatory power of the model is moderate, as 35% of internal sustainability policies adoption ($R^2 = 0.350$) is explained by external drives related to sustainability and customers' demands of sustainability (see Figure 2 and Table 4).

As observed in the table, all the inferred relationships were validated in the context of the current research. External drivers related to sustainability proved to positively influence customers' demands of sustainability (H1 supported) as well as the internal sustainability policies adoption (H2 supported). In its own right, customers' demands of sustainability exert a positive effect on internal sustainability policies adoption (H3 supported) while the latter has a positive influence on the costs derived from sustainability policies adoption (H4 supported).

In order to assess the predictive power of the structural model, the PLSpredict procedure was used (Cheah et al., 2023; Shmueli et al., 2019). The procedure relied on the division of the sample into a specific number of k subsets of equal size (i.e., 10), PLSpredict combining $k - 1$ subsets to compute the parameters needed to predict the case values of the left-out subset, respectively the holdout sample. The process was repeated 10 times provided that each of the subsets acted as a holdout sample once. Further, the PLS path model's predictive power was evaluated based on the comparison with the prediction error, usually calculated via the root mean squared error (RMSE), combined with the value of a naïve mean value prediction benchmark (Q^2 predict) and with the parameters imposed by the linear model (LM) benchmark (Sarstedt et al., 2023; Shmueli et al., 2019).

According to Hair et al. (2019) and García-Machado et al. (2021), two main indices were employed to assess the results of the PLS path model from the standpoint of the predictive performance. Firstly, we investigated the Q^2 values to see whether they are positive or not. Provided that the values are positive, it can be concluded that the PLS-SEM model offers better predictive performance. Secondly, we performed a comparison between the linear regression model (LM) results and PLS-SEM results to test whether the latter have a smaller prediction error in what concerns RMSE or mean absolute error (MAE) (Table 5).

With a view to rightfully selecting RMSE or MAE values, we explored whether the prediction errors were symmetrically distributed, focusing on the skewness (Table 6). Here, whenever the asymmetry in the absolute value is below 1, the RMSE values are employed as milestone for the prediction error whereas the asymmetry in the absolute value above 1 entailed the requirement to use the MAE values as criterion (García-Machado et al., 2021).

As displayed in Table 5, apart from one indicator (IS5), all the values of Q^2 inherent to the endogenous variables were positive.

TABLE 4 Path coefficients of the structural equation model.

Paths	Path coefficients	Standard deviation	T-value	CI[a]	P-value	Hypotheses
External drivers related to sustainability → Customers' demands of sustainability	0.553	0.064	8.642	0.443–0.694	0.000	H1-Accepted
External drivers related to sustainability → Internal sustainability policies adoption	0.330	0.139	2.381	0.063–0.599	0.017	H2-Accepted
Customers' demands of sustainability → Internal sustainability policies adoption	0.342	0.140	2.438	0.055–0.607	0.015	H3-Accepted
Internal sustainability policies adoption → Costs derived from sustainability policies adoption	0.294	0.133	2.208	0.032–0.520	0.027	H4-Accepted

[a]CI, confidence interval (2.5%–97.5%).
*$p < 0.1$; **$p < 0.05$; ***$p < 0.001$.

TABLE 5 Manifest variable (MV) prediction summary.

MV	Q^2 predict	PLS-SEM_RMSE	PLS-SEM_MAE	LM_RMSE	LM_MAE
SC1	0.014	0.762	0.569	0.794	0.609
SC2	0.010	0.773	0.610	0.818	0.624
CD1	0.291	0.847	0.679	0.812	0.652
CD2	0.177	1.032	0.883	0.993	0.835
CD3	0.028	1.107	0.900	1.109	0.897
CD4	0.228	0.929	0.730	0.932	0.741
IS1	0.112	0.885	0.696	0.925	0.718
IS3	0.229	0.787	0.578	0.812	0.589
IS4	0.238	0.798	0.634	0.817	0.643
IS5	−0.007	1.087	0.894	1.096	0.928

TABLE 6 Descriptive statistics of the prediction errors.

MV	Mean	Median	Observed min	Observed max	Standard deviation	Excess kurtosis	Skewness	Number of observations used	Cramér–von Mises test statistic	Cramér–von Mises *p* value
SC1	0.002	−0.044	−1.224	2.296	0.762	−0.143	0.334	710	3.865	0
SC2	0.002	−0.35	−1.575	2.929	0.773	2.573	1.377	710	8.709	0
CD1	−0.001	0.12	−2.506	1.761	0.847	0.213	−0.597	710	1.084	0
CD2	−0.001	0.065	−2.056	2.451	1.032	−0.843	−0.033	710	0.968	0
CD3	0.001	0.01	−2.903	2.409	1.107	−0.625	−0.07	710	0.406	0
CD4	−0.001	0.051	−2.184	2.496	0.929	0.044	−0.145	710	0.269	0.001
IS1	0.001	0.141	−2.971	2.159	0.885	0.589	−0.525	710	0.988	0
IS3	0.001	−0.036	−2.531	2.651	0.787	1.508	−0.037	710	1.197	0
IS4	0.001	0.047	−2.559	1.635	0.798	0.22	−0.444	710	0.517	0
IS5	0.001	0.016	−2.436	2.862	1.087	−0.232	0.125	710	0.693	0

Further, as shown in Table 6, almost all the values of the skewness are below 1 (except for SC2), therefore the RMSE criterion was used to compute the differences in the prediction errors between the predictions based on PLS and the ones apposite for the LM which implicitly ignored the specified path PLS model. The findings indicated that most indicators of the endogenous variables reported lower values for PLS-SEM RMSE than for LM RMSE, therefore the model may be considered as having a medium predictive power (Shmueli et al., 2019).

5 | DISCUSSION OF THE FINDINGS

Looking into the results retrieved for the structural model assessment, it may be observed that all the presumed relationships were supported in the context of the current research. To start with, the first hypothesis (H1) inferred that the external drivers related to sustainability have a positive influence on customers' demands of sustainability. The results ($\beta = 0.553$; *T*-value = 8.642; and $p < 0.000$) show the strong and positive influence between the two variables thus H1 can be accepted. Evidence is thus brought forward in favor of how customers react to the present-day sustainability agenda and imperatives at the societal scale (i.e., growing importance of business model sustainability, general propensity towards sustainable products, etc.). The increasing attention paid on the multidimensional compliance with sustainability principles and strategies has also infiltrated into the food service sector, determining stakeholders' expectations and explicit demands (i.e., calls for greater transparency on the origin of the products, greater clarity on the choice of suppliers who share sustainable choices, innovative management of internal human resources, etc.). These issues have been partially addressed by previous literature—Baloğlu et al. (2020), Jacobs and Klosse (2016), Gazzola et al. (2022), Liu and Tse (2018), Abdou et al. (2023), and so forth. For example, the findings complement and confirm the insights provided by Baloğlu et al. (2020), Huang et al. (2023), and Jacobs and Klosse (2016) who have pinpointed the external drivers for sustainability in the restaurant industry (i.e., customer choices, the sustainability-driven selection of suppliers and investors, market competition, exiting norms and regulations, restaurant recognition and reputation). Taken together, these drivers are descriptive of the societal transformations towards the sustainability imperative for environmental conservation, public health, and long-term economic viability.

The second hypothesis (H2) assumed that the external drivers related to sustainability exert a positive influence on the internal sustainability policies adoption. The results ($\beta = 0.330$; *T*-value = 2.381; and $p < 0.05$) depict a strong positive and significant influence, so H2 can also be confirmed. Following the same line of reasoning as for the first hypothesis, the adoption of sustainability policies as a result of the growing importance of sustainability as a whole comes forward as natural. The Michelin-starred restaurants have acknowledged the exigency to approach sustainability as a sine-qua-non condition for their strategic development and competitiveness. The evidence brought by the present study is consistent with the standpoints of Salzberg (2016), Huang and Hall (2023), and Chams and García-Blandón (2019) who noticed that the internalization of sustainable policies was rooted in the increasing external pressure for businesses to become more sustainable. In most cases, failing to account for sustainable practices may lead to a negative overall approach of the business model a restaurant applies. The findings also complement the arguments brought forward by Baloğlu et al. (2020) who asserted that the internal sustainability policies in restaurants are often focused on changes in operations, management, and culture to reduce the ecological footprint and enhance social responsibility. Consequently, keeping pace with the sustainability macrotrends becomes a major prerequisite for high-end restaurants willing to set the standard in the industry.

Further, third hypothesis (H3) presumed that customers' demands of sustainability have a strong influence on the internal sustainability policies adoption. In this case, the results ($\beta = 0.342$; *T*-value = 2.438; and $p < 0.05$) show a more intensive, positive, and significant relation, which allows the acceptance of the hypothesis. Alongside the external drivers of sustainability mainly objectivized via the growing importance of sustainability on business models, customers' demands of sustainability have proved to be a worthy antecedent of internal

sustainability policies adoption, as also tackled by Raab et al. (2018), Jang and Zheng (2020), and Cho and Yoo (2021) among others. The study provides new evidence supporting previous findings that ensuring greater transparency regarding product origins, clarity in selecting suppliers who prioritize sustainability, innovative management of internal human resources, and precautions related to the functioning of the structure (set-up and components) emerge as key factors influencing restaurants' sustainability response. These entail the reduction of waste production and proper disposal, a transparent communication of the sustainable practices implemented, the use of sustainable fittings and components and innovative human resource management, all of them becoming the norm for Michelin-starred restaurants.

The fourth hypothesis (H4) studied the relation between internal sustainability policies adoption and the costs derived from sustainability policies adoption. The influence proves to be positive and significant ($\beta = 0.294$; T-value $= 2.208$; and $p < 0.05$) although of a lower intensity, but the hypothesis is supported. As expected, sustainability policies adoption is not exempted from higher internal company costs and higher final cost to the customer. In line with Mak and Chang (2019) and Perramon et al. (2014), being proactive about sustainability issues yields benefits restaurants in terms of competitiveness, yet it conduces to cost increase. Oftentimes, higher quality entails higher costs, a fact which is naturally understood by the customers of Michelin-starred restaurants.

6 | CONCLUSIONS AND IMPLICATIONS

Revolving around the internal sustainability policies adoption in the case of Italian Michelin-starred restaurants, the explanatory power of the proposed model sprang as moderate, given that 35% of the variance in internal sustainability policies adoption is explained by external drives related to sustainability and customers' demands of sustainability. The same applies to the predictive power of the model which indicated a moderate extent. Moreover, all the investigated hypotheses were supported by the empirical investigation probing the positive influences of external drivers and customers' demands on internal sustainability policies adoption and further on the derived costs.

6.1 | Theoretical implications

By availing this evidence, the unfolded study has both theoretical and practical implications. To start with, from a conceptual standpoint, the advanced research model is novel and intends to capture the underlying relationships between various sustainability facets, progressing from the external drivers towards individual-centric drivers (i.e., customers' demands) and further towards the organizational-based drivers (i.e., the business policies of Michelin-starred restaurants). Beyond the simplicity of a four-factor model, a processual approach is brought forward, exhibiting the way sustainability-driven macrotrends impact individuals and organizations at the same time. Moreover, even though sustainability policies adoption has a significant influence on the implied financial costs, they do not lead to a substantial effect in this front (the coefficient of determination in the structural model is insignificant). From the standpoint of predictive power, the model probed a moderate predictive power, thus indicating a reasonable ability to predict new results. Based on this evidence, it is likely that the proposed model may be descriptive of other contexts (beyond the Italian context) and that the findings may properly depict the situation of Michelin restaurants in other countries. Such approach is also supported by the extant studies on the sustainability characteristics of Michelin restaurants in a cross-national research setting which have reached similar conclusions (please see Huang et al., 2023).

6.2 | Practical implications

In terms of organizational and social implications, it becomes obvious that the food service industry cannot neglect the sustainability pressures on all business models. In order to achieve long-term performance and competitiveness, to stay in the game of the best, Michelin-starred restaurants are dared to invest substantial resources in their sustainability-focused policies. Either these refer to environmental concerns, or to social challenges, they all have to be integrated in a sustainable business model which gives credit to macrofactors alongside customers' demands. By striving to set a high standard in the food service industry, Michelin-starred restaurants are challenged to play the card of sustainability together with the one of excellence with a view to preserve their emblematic position.

By successfully corroborating sustainability imperatives and industry excellence, Michelin restaurants are likely to force other actors in and beyond the food sector to follow their example and strive for higher standards. By means of a snowball effect, other stakeholders may progressively acknowledge the benefits of adopting sustainability as a core value of their businesses. More specifically, the adoption of sustainable practices by Michelin-rated restaurants can have substantial social ramifications with a range of impacts. On the one hand, the well-being of employees is likely to be positively influenced when restaurants use social sustainability practices, such as ensuring equitable remuneration, establishing job security, and providing favorable working circumstances. This phenomenon has the potential to result in enhanced levels of employee satisfaction and increased rates of staff retention. On the other hand, it also boils down to the support for local economy—through the practice of acquiring products from local suppliers, restaurants have the ability to contribute to the sustenance of local economies, so upholding the livelihoods of nearby farmers and producers. Additionally, this triggers community engagement. Restaurants have the potential to enhance their involvement in local communities by actively supporting local initiatives and imparting knowledge to consumers regarding the significance of sustainability.

The promotion of fair-trade practices can contribute to the cultivation of justice and fairness within the food supply chain, thereby guaranteeing that producers in developing nations are remunerated justly for their goods. On a broader scale, the utilization of influential establishments such as Michelin-rated restaurants to advocate for sustainability has the capacity to generate significant changes in consumer behavior, fostering heightened awareness and a stronger demand for sustainable practices throughout the dining industry.

6.3 | Limitations and future research directions

Despite its exploratory goal, the present investigation is not exempted from certain limitations. First of all, it relies on a convenience sample of 71 key informants from Michelin-starred restaurants. Furthermore, all the subjects come from Italy. Acknowledging that one-country studies may also have a phenomenological value, future endeavors covering samples from multiple countries are welcome and topical.

Secondly, the conceptual model revolved around various sustainability-related issues and on their interconnections, leaving aside additional general or specific factors (i.e., other industry transformation pressures, employees' demands, etc.). Future research may compensate for this shortcoming by extending the scope of the model.

Thirdly, the examination relied on self-reported measures, thus implying a high level of subjectivity. In this respect, further investigations may envisage other research methods to collect data (i.e., interview-based surveys, document analysis) so as to provide more or deeper insights into the sustainability imperatives apposite for the food service industry.

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