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Farm-to-Fork and Sustainable Agriculture Practices: Perceived Economic Benefit as a Moderator and Environmental Sustainability as a Mediator

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Abstract: In recent years, there has been growing interest in promoting sustainable agriculture and reducing the environmental impact of the food system. One approach to achieving these goals is through farm-to-Fork (FTF) sourcing, which involves direct procurement of food products from local farms to restaurants table. This approach has been touted as a way to support sustainable agriculture and decrease the carbon footprint of the food supply chain. This study aims to explore the relationship between farm-to-fork sourcing, perceived economic benefit, and environmental sustainability. Specifically, the research examines the moderating effect of the perceived economic benefit as well as the mediating role of environmental sustainability in the relationship between farm-to-fork (FTF) sourcing and sustainable agriculture practices. To investigate these relationships, a web-based questionnaire was designed and collected from 298 farmers. The collected data were analyzed via PLS-SEM. The results of the study suggest that farm-to-fork sourcing has a positive impact on sustainable agriculture practices and both perceived economic benefit and environmental sustainability have a moderating and mediating role in these relationships. This finding is consistent with the idea that direct procurement of food from local farms can lead to economic benefits for both farmers and restaurants, while also reducing the carbon footprint of the food supply chain.

Keywords: farm-to-fork; sustainable agriculture; environmental sustainability; perceived economic benefit; green management; sustainable performance

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1. Introduction

Conventional agricultural production practices refer to the methods used in modern-day farming that rely on chemical fertilizers, pesticides, and genetically modified crops to boost yields. While these practices have led to significant increases in crop productivity, they have also created a range of problems that threaten the long-term sustainability of our food production systems. The need for more sustainable, regenerative agricultural practices is becoming increasingly urgent as we confront the challenges of climate change, and resource depletion [1]. In Africa, traditional agriculture management procedures and associated land usage shifts account for one-third of greenhouse gas (GHG) emissions [2,3]. These environmental problems are expected to be aggravated by the increasing demand for the food production to fulfill needs and the expected dietary changes [4]. Scholars asserted that increasing production to satisfy the demand for dietary changes must be achieved alongside reduced GHG emissions. In sum, sustainable agroecosystems must be built to fulfil today's food and other product demands while also protecting the essential

natural resource base that will let future generations satisfy their needs [5]. Thus, increasing agriculture production efficiency, enhancing farming techniques that depend on local resources, and designing resilient strategies in the face of a changing climate all necessitate extensive sustainable agricultural practices [6]. According to the Abdelrazek and El Khafif study conducted in Egypt, sustainable agricultural practices result in water savings of 60–70%, savings in energy network power of 80–90%, chemical fertilizer savings of 60–70%, and savings in spraying of >50% [7]. While it has been proven that agricultural techniques supporting the environmental, economic, and social sustainability of farming are effective, the widespread adoption of sustainable agricultural practices is lacking [1].

Previous research has highlighted economic constraints, social variables, farmer characteristics, sustainable practice qualities, information development and dissemination, production marketing, and infrastructural conditions as obstacles to implementing sustainable agricultural practices [1,8–10]. Therefore, adopting these sustainable practices typically necessitates explicit incentives, substantial effort on the part of farmers, and the cooperation of public–private and government partnerships at the local and national levels [11]. In the same vein, according to Musa and Chin [12], farm-to-fork (FTF) agritourism activities can support sustainable development in rural destinations (including sustainable agricultural practices). Through FTF practices, farmers have a regulated capitalization of sustainable agricultural manufacture and associations with its consumers without the involvement of a third party. The farm-to-fork (FTF) concept reflects the interdependence among agriculture as a main food source of local activities and tourism as a booster of local agricultural food goods and activities [13]. Thus, FTF activities, as a form of sustainable agritourism, are sure to improve local environmental sustainability by supporting the host community's quality of life, supplying a high-quality experience for guests, and maintaining environmental quality on which, both the host community and guests rely [14–16].

Developing countries have meager adoption rates of sustainable agricultural practices [17]; here, some studies identified economic factors as a significant obstacle during the transition and implementation of sustainable agricultural practices, particularly when new equipment and supplies are required, as well as the low income level of farmers [18,19]. However, we argue that agriculture–tourism partnerships through the farm-to-fork (FTF) approach can enable farmers to overcome the economic barriers to adopting sustainable agricultural practices through mutual economic benefits resulting from the shortened supply chain [20].

Previous research discussed different barriers to adopting sustainable agricultural practices, but they have yet to concentrate mainly on developing countries [21–24]. Still, they need to address agriculture–tourism partnerships as a tool for the success of sustainable agricultural practice adoption. Consequently, our study endeavors to seal this gap by (1) testing the role of the farm-to-fork (FTF) approach in boosting sustainable agricultural practices, (2) exploring the mediating role of environmental sustainability between the farm-to-fork (FTF) approach and sustainable agricultural practices, and lastly, (3) conducting an assessment of the moderating role of perceived economic benefits in the relationship between environmental sustainability and sustainable agriculture. As far as the authors are aware, this research is among the initial studies to investigate these direct, moderating, and mediating connections within a single model and setting, utilizing PLS-SEM as the primary approach for analyzing the data.

2. The Context of Egypt

Egypt, a country that heavily relies on tourism, has recently taken steps towards a more sustainable tourism industry. The country's tourism industry has faced several challenges over the years, including political instability and security concerns [25]. In response, the government has launched the "Egypt Sustainable Tourism Initiative" aimed at promoting responsible and sustainable tourism practices. The initiative aims to balance the country's economic needs with environmental and cultural preservation [26]. It focuses on three main pillars: environmental sustainability, social sustainability, and economic sustainability [27]. In addition to the Egypt Sustainable Tourism Initiative aimed at promoting responsible

and sustainable tourism practices [28], Egypt has also taken steps towards implementing farm-to-fork (FTF) practices in its tourism industry.

Farm-to-fork (FTF) practices involve sourcing food directly from local farmers and producers and using it in restaurants and hotels [12]. There are numerous advantages to this, such as decreasing the environmental repercussions of food transportation, bolstering local economies, and offering tourists fresher and healthier food choices. The Egyptian government has recognized the potential of farm-to-fork (FTF) practices in promoting sustainable tourism and supporting local farmers [29]. As a result, several initiatives have been launched to promote the use of locally sourced food in the tourism industry. One such initiative is the "from farm to fork or F2F" initiative launched last 2020 for a healthy and eco-friendly food system [30]. This initiative is a part of the "European Green Deal." It is "a comprehensive 10-year strategy aiming to address the challenges of producing and consuming our food in a fair and sustainable way by reconciling what we eat within the capacity of our planet" [31]. This approach primarily aims to achieve five goals: (1) guaranteeing sustainable food production and its security; (2) lowering food loss and waste; (3) encouraging sustainable food consumption and easing the transition to sustainable, healthy diets; (4) encouraging sustainable food processing, wholesale, retail, hospitality, and food services practices; and (5) combating food fraud along the food supply chain [31]. According to studies, these five bases, for example, can successfully achieve a 50% pesticide reduction in general [32], decrease applied pesticide quantities by more than 60% based on canopy attributes in apple trees to lower environmental risks [30,33], and improve the proportion of "organic agriculture" to up to 25% by 2030 [34]. Accordingly, hotels and restaurants strived to use local, seasonal, and organic ingredients in their menus and work directly with local farmers and producers [35]. This not only supports local businesses and communities but also provides tourists with an authentic and unique culinary experience. Another initiative aims to promote food safety and hygiene standards in hotels and restaurants, while also encouraging the use of locally sourced food [35]. This helps ensure that tourists can enjoy fresh and healthy food options while also supporting local farmers and producers [36]. Egypt's focus on farm-to-fork (FTF) practices (as in Siwa city [36]) is not only beneficial for the tourism industry but also supports the country's overall sustainable development goals. By promoting sustainable agriculture practices and reducing food transportation, the initiative helps reduce greenhouse gas emissions and conserve natural resources [37].

3. Theoretical Foundations and Hypotheses Formulation

3.1. Farm-to-Fork (FTF) Concept and Sustainable Agriculture

Sustainable agricultural practices are agricultural methods that promote efficiency in using natural resources while also reducing the environmental consequences of agriculture and boosting farmers' adaptive ability to climate change [38,39]. In general, sustainable agriculture was described as "an agriculture/farming system in sustainable ways to satisfy people's present food and textile needs, without compromising the ability for contemporary or next generations to acquire their needs based on an understanding of ecosystem services" [40]. Conservation agriculture methods such as mulching, no-tillage, crop rotation, soil conservation, and intercropping, as well as climate-smart agriculture techniques such as pit implanting, the use of biological manure, agroforestry, water-based harvesting systems, alternative marketing, and erosion management bunds are examples of sustainable agricultural practices [3]. Green farmers also increasingly rely on the intelligent re-engineering of manufacture techniques to aid in the interior control of pests and soil fertility, careful control of modern power and rainfall, and dependence on local sources instead of imported materials [5]. Adopting sustainable agricultural practices, then, results in sustainable agricultural performance (e.g., economic, social, and environmental) through enhancing yields and family income [41], enhancing food safety and economic development [42], lowering or eliminating the usage of harmful materials such as chemical

fertilizer, insecticides, and weedkillers, and resulting the efficient usage of natural resources and decreased dependence on synthetic inputs [43,44].

Previous research found that socioeconomic variables, farm features, and agroclimatic area characteristics were the most influential factors that may restrict the adoption of sustainable agriculture techniques [45]. However, some scholars revealed that agriculture–tourism partnerships through a farm-to-fork (FTF) approach might decrease the sustainable agricultural practice barriers [46]. Improving agriculture–tourism links provides considerable prospects for encouraging local manufacture, keeping tourism profits in the region, and enhancing the allocation of economic advantages from tourism to rural communities [47]. As one of the agriculture–tourism partnerships, the farm-to-fork (FTF) approach seeks to promote high-quality tourism and hospitality goods by establishing a value chain that encourages the usage of local agricultural products in the tourist sector [48]. Vegetables, fruits, animal products, and handicrafts are among the essential products that can be included in the short supply chain between hotels, restaurants, and residents in Luxor and Aswan. Here, Berno [49] suggests that this notion does not have to end with the eating experience; it can also include various associated indirect and direct agritourism practices and goods, such as flower gardening, food commemorations, farm holidays, factory trips, and value-added items, such as souvenir food merchandise, expanding the advantages to the local community even more. Through increasing involvement, perceived customer efficacy, and perceived availability, more sustainable food consumption can be encouraged [50]. Thus, developing and promoting the farm-to-fork (FTF) approach can support sustainable agriculture practices by raising demand for local activities and products [49]. In the same vein, the benefits of this approach are not only accruing for sustainable agriculture and the local rural community but also for the restaurants and hotels that adopt it. Hotels and restaurant guests, especially green guests, believe that shortening the distribution channel and purchasing directly from farmers allow them to purchase far more excellent healthy products at lower prices than those bought from sizeable retail grocery stores because of the lowered lead time, thus permitting fruits and vegetables to mature naturally and reducing transportation costs [46]. Additionally, Smaal's study [51] concluded, after conducting direct interviews with 22 restaurants and 33 farm owners, that the farm-to-fork (FTF) initiative that satisfies customers' eco-friendly requirements financially benefits both parties and enhances trust between them, although some issues need government assistance. Additionally, in response to green guest pressure, and in an effort to be more environmentally consciously, restaurants have made attempts to source some of their ingredients locally (farm-to-fork (FTF) approach) [52]. Thus, by adopting and promoting the principles of the farm-to-fork (FTF) concept, hotels and restaurants can satisfy customers' needs for an authentic and high-quality experience [53], as well as local food experiences. In short, by adopting the principles of the farm-to-fork (FTF) concept, the local rural community (sustainable agriculture practices), restaurants, and hotels reciprocate the benefits. Given the social exchange theory (SET), we can propose the following hypotheses.

Hypothesis 1 (H1). *The farm-to-fork (FTF) conceptis positively associated with sustainable agriculture.*

3.2. Farm-to-Fork (FTF) Concept and Environmental Sustainability

Broadly speaking, environmental sustainability pertains to the objective of safeguarding and protecting environmental resources for the well-being of future generations [54]. Specifically, environmental sustainability indicates the rates of "renewable resource harvest, pollution creation, and non-renewable resource depletion" that can be kept continuously. These rates are not sustainable if they are inconsistent [55,56]. Thus, environmental sustainability is considered important to sustainable development since it strives to preserve natural capital without exceeding the environment's assimilative waste capacity or regenerating capabilities [57,58]. In the tourism and hospitality context, Elshaer et al. [59] indicate that tourist activities can attain environmental sustainability by safeguarding natural, physical, and man-made resources, adhering to ethical principles, implementing appropriate policies and standards, and mitigating the detrimental impacts on the envi-

ronment. Accordingly, we argue that tourism and hospitality through the farm-to-fork (FTF) concept can enhance rural environmental sustainability. Based on this discussion, the below hypothesis is proposed:

Hypothesis 2 (H2). *Farm-to-fork (FTF) concept is positively associated with environmental sustainability.*

3.3. Environmental Sustainability and Sustainable Agriculture

Multiple studies explicitly highlight the significance of environmental sustainability as a vital factor in ensuring the long-term competitiveness of tourism destinations and enhancing the quality of life for local residents [60–62]. Based on the study of Abu-Hashim et al. [54], we argue that environmental sustainability arising from environmentally friendly tourism and hospitality activities (i.e., farm-to-fork (FTF) approach) that support local communities reinforces agro-environmental sustainability, which includes sustainable agricultural practices. These arguments lead to the hypothesis below:

Hypothesis 3 (H3). *Environmental sustainability is positively associated with social sustainable agriculture.*

Based on the social exchange theory (SET) and integration of prior evidence, and depending on the justifications mentioned earlier of the suggested three hypotheses, we proposed the following hypotheses for mediation associations:

Hypothesis 4 (H4). *Environmental sustainabilitymediates the association between the farm-to-fork (FTF) concept and sustainable agriculture.*

3.4. Perceived Economic Benefit as a Moderator

In developing economies, in addition to farmers' poor economic situation in general, some research identified two central issues: inadequate financial support for sustainable agribusinesses and inaccessibility to capital for these businesses due to the complicated procedures required to develop agri-finance [63]. Thus, the only way to reach greater sustainability in the agricultural field is by combining long-term sustainability and profit along with environmental and social factors [5]. Based on the rationality theory, individuals' inclination to participate in specific behaviors is influenced by either their formal or substantive rationality. Formal rationality primarily considers economic factors, whereas substantive rationality encompasses non-economic factors such as ethics and psychological motivations [64]. Accordingly, when farmers decide whether to adopt sustainable agricultural practices or not, they consider the personal and economical rewards that might be achieved from this adoption [15]. Thus, including the farm-to-fork (FTF) approach in the farm's marketing products plan could provide them with large, stable direct accounts [65]. These arguments encourage authors to argue that the perceived economic benefits that agriculture–tourism partnerships generate through adopting the farm-to-fork (FTF) concept principles boost the relationship between environmental sustainability and sustainable agriculture. Thus, this study, based on the rationality theory, suggests the following hypothesis, which is illustrated in Figure 1:

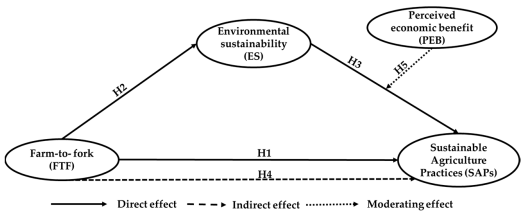

Figure 1. The research model: five study hypotheses, including the direct association of FTF with SAPs (H1) and ES (H2) and the direct effect of ES on SAPs (H3); the mediating role of ES between FTF and SAPs (H4) and moderating role of PEB in the relationship between ES and SAPs (H5).

Hypothesis 5 (H5). *Perceived economic benefit moderates the influence of environmental sustainability on sustainable agriculture.*

4. Materials and Methods

4.1. Measures

To put the theories to the test, a questionnaire-based survey was designed and disseminated. The study's scales were established after a comprehensive examination of the literature. As a result, five dimensions were determined. The farm-to-fork (FTF) concept was operationalized into 5 items based on the suggestion of [47,49]. Sustainable agricultural practices (SAPs) were measured by nine-item a scale recommended by the authors of [66]. Finally, environmental sustainability (ES) and perceived economic benefit (PEB) ware operationalized using the nine-item scale proposed by the authors of [14] (see Appendix A). It is well-known in Egypt that rural areas are intertwined with tourist places, and many farmers and local residents rely on tourism as a primary source of income, whether from various partnerships or because the rural area itself is attractive to tourism. Therefore, it can be argued that these measures are appropriate for this study. Furthermore, the survey questions were transcribed and clarified to guarantee their easy comprehensibility. After creating the scale items, one researcher transformed the questionnaire into an online format. The research team thoroughly reviewed the online version before sharing the URL with the intended participants. The main objectives of the study were clearly defined, and participants were asked to contribute by completing the survey. Participants were assured of the confidentiality and anonymity of their responses. The URL of the questionnaire was shared with participants through their social media profiles. The research team regularly checked for responses on a daily basis. Following the completion of the questionnaire, participants were given the opportunity to provide personal details, such as their name, phone number, email address, and social media profiles. Afterwards, the questionnaire underwent a translation process from English to Arabic, and a total of sixteen individuals, including eight academics and eight professionals in the relevant field, were involved in the testing of the survey to ensure its validity. The content of the survey was kept the same and was not modified during this process. We employed a scale ranging from 1 (indicating a strong disagreement) to 5 (indicating a strong agreement) in the survey.

4.2. Participants and Process of Data Collection

The collection of data was conducted by administering a survey in the form of a web-based questionnaire targeted at farmers in Luxor and Aswan, located in upper Egypt. Luxor has 45 fixed hotels of different levels with a total of 5136 rooms and a capacity of 10,307 beds, 282 floating hotels with a total of 16,604 rooms and a capacity of 32,785 beds, 35 popular hotels with a total of 564 rooms and a capacity of 1181 beds, 180 floating hotels out of 288 total floating hotels in the Nile River, 177 tourism companies, and 41 tourist restaurants; in general, there is a full capacity of 22 thousand rooms, including those in floating hotels. At the same time, Aswan owns 64 hotels between floating and fixed. The occupancy rate in hotels of all types ranged between 60% and 70% during the tourist season in the winter of 2023 [67]. Additionally, in the city of Luxor, 65,000 feddans of sugar cane, 48,000 feddans of wheat, 12,000 feddans of tomatoes, 6000 feddans of maize, and 6500 feddans of bananas are grown, in addition to grapes, cantaloupe, green beans, green onions, green garlic, and strawberries. Among the essential agriculture-based industries in Luxor are the manufacture of black honey, the manufacture of molasses, the fodder industry, the manufacture of paper and cardboard, the wood and paraffin industry, the manufacture of sauce and tomato paste, the drying of tomatoes, and the drying of onions. Similarly, in the Aswan governorate, about 29% of the population works in cultivating an area of 229 thousand feddans [68].

Farm-to-fork (FTF) sourcing is becoming an increasingly popular approach to sustainable agriculture in many countries, and Egypt is no exception. In particular, the Egyptian cities of Luxor and Aswan have been at the forefront of this trend, with a growing number

of restaurants and cafes seeking to source their ingredients directly from local farms. In these areas, farmers have traditionally relied on selling their produce in local markets or to intermediaries who then sell it to larger retailers or processors. However, the rise of farm-to-fork (FTF) sourcing is allowing farmers to bypass these intermediaries and sell directly to restaurants, hotels, and cafes, creating new economic opportunities for local farmers and promoting sustainable agricultural practices. The survey was divided into two stages. Farmers were required to provide the necessary information for the farm-to-fork (FTF) concept, the variables of sustainable agricultural practices (SAPs), and demographic data in the 1st survey phase. One month later, farmers in the same rural destinations were requested to complete questionnaires assessing variables related to environmental sustainability (ES) and perceived economic benefits (PEB). The study adopted the online questionnaire because the authors have a lot of postgraduate colleagues working in hotels and restaurants in the two study areas. They were asked to send the questionnaire to the target sample through social media (WhatsApp, e-mail, etc.), as well as targeting the residents' various social media groups. Before closing the questionnaire, three alerts were sent within three weeks for each distribution stage. In total, 400 questionnaire forms were distributed for both surveys. After excluding ineligible forms, 298 valid responses were analyzed, resulting in an effective response rate of 74.5%. The study sample consisted of 246 males (82.6%) and 52 females (17.4%). The age of the participants predominantly fell within the range of 28 to 58 years old.

Using an independent *t*-test sample approach, a non-response bias analysis was performed. Bias from non-response was not an issue in this investigation because the mean variation between early and late answers did not demonstrate any statistically significant value ($p > 0.05$).

4.3. Data Analysis Methods

"Structural Equation Modelling" (SEM) and "Partial least squares" (PLS) were employed so that the justified relationships between the farm-to-fork (FTF) concept and the variables of sustainable agricultural practices (SAPs) with the mediating role of the environmental sustainability (ES) and moderating role of the perceived economic benefit (PEB) variable could be tested and estimated. The utilization of PLS-SEM enables the incorporation of a greater number of reflective items per factor when compared to alternative statistical methods. Our analysis of the collected data followed Leguina's [69] two-step approach, which involves evaluating the validity and reliability of the measurement with the outer model first, and then testing and confirming hypotheses with the structural model. To assess the outer measurement model, we applied the criteria advocated by Hair et al. [70], which include various threshold metrics such as "standardized factor loading" (greater than 0.7), "composite reliability, CR" (greater than 0.7), "average variance extracted, AVE" (greater than 0.5), R2 (greater than 0.1), and Stone–Geisser Q2 (greater than 0.0).

5. The Study Results

5.1. Measurement Model Assessment (Outer Model)

In line with the approach proposed by Hair et al. [71], we have evaluated various aspects of the measurement model, including construct validity, factor loadings, reliability, averaged variance extracted (AVE), internal consistency, (as shown in Table 1), and the dimensions' discriminant validity using factor cross-loadings (as shown in Table 2), the Fornell–Larcker criterion (as shown in Table 3), and heterotrait–monotrait criterion (as shown in Table 4). All suggested cutoff criteria were satisfactory [71,72], indicating that the proposed outer model is appropriate, and the scale demonstrates good convergent validity [73]. Regarding the discriminant validity of dimensions, both the Fornell–Larcker and heterotrait–monotrait values satisfied the recommended thresholds [74], indicating that our measures have good discriminant validity.

Table 1. Psychometric metrics.

	Loadings	***a* Value**	**CR**	**AVE**
Thresholds	**>0.7**	**>0.7**	**>0.7**	**>0.5**
Farm-to-fork (FTF) concept		0.917	0.938	0.751
FTF_1	0.868			
FTF_2	0.850			
FTF_3	0.917			
FTF_4	0.824			
FTF_5	0.873			
Sustainable agricultural practices (SAPs)		0.939	0.949	0.673
SAP_1	0.717			
SAP_2	0.847			
SAP_3	0.800			
SAP_4	0.832			
SAP_5	0.852			
SAP_6	0.845			
SAP_7	0.793			
SAP_8	0.838			
SAP_9	0.848			
Environmental sustainability (ES)		0.929	0.946	0.778
ES_1	0.867			
ES_2	0.871			
ES_3	0.890			
ES_4	0.905			
ES_5	0.877			
Perceived economic benefit (PEB)		0.894	0.927	0.760
PEF_1	0.800			
PEF_2	0.885			
PEF_3	0.880			
PEF_4	0.917			

Table 2. Fac. cross-loadings.

	FTF	**SAPs**	**ES**	**PEB**
FTF_1	**0.868**	0.683	0.661	0.645
FTF_2	**0.850**	0.705	0.504	0.573
FTF_3	**0.917**	0.555	0.570	0.572
FTF_4	**0.824**	0.476	0.546	0.531
FTF_5	**0.873**	0.568	0.538	0.554
SAP_1	0.523	**0.717**	0.420	0.573
SAP_2	0.656	**0.847**	0.517	0.591
SAP_3	0.615	**0.800**	0.467	0.376
SAP_4	0.574	**0.832**	0.700	0.529
SAP_5	0.579	**0.852**	0.637	0.570
SAP_6	0.578	**0.845**	0.623	0.496
SAP_7	0.507	**0.793**	0.471	0.369
SAP_8	0.504	**0.838**	0.426	0.494
SAP_9	0.590	**0.848**	0.493	0.571
ES_1	0.677	0.604	**0.867**	0.646
ES_2	0.572	0.600	**0.871**	0.598
ES_3	0.524	0.594	**0.890**	0.557
ES_4	0.541	0.537	**0.905**	0.568
ES_5	0.552	0.528	**0.877**	0.555
PEF_1	0.629	0.481	0.543	**0.800**
PEF_2	0.584	0.552	0.607	**0.885**
PEF_3	0.496	0.496	0.518	**0.880**
PEF_4	0.617	0.626	0.642	**0.917**

Bold items: "for good discriminant validity, the outer loading should have higher value than the cross-loading".

Table 3. Fornell–Larcker criterion matrix.

	ES	FTF	PEB	SAPs
Environmental sustainability (ES)	**0.882**			
Farm-to-fork (FTF)	0.654	**0.867**		
Perceived economic benefit (PEB)	0.666	0.667	**0.872**	
Sustainable agricultural practices (SAPs)	0.652	0.697	0.623	**0.820**

Bold values: "for adequate discriminant validity, AVE (bold) has to show scores that are higher than the intervariable correlation coefficient".

Table 4. HTMT matrix.

	ES	FTF	PEB	SAPs
Environmental sustainability (ES)				
Farm-to-fork (FTF)	0.700			
Perceived economic benefit (PEB)	0.724	0.733		
Sustainable agricultural practices (SAPs)	0.687	0.740	0.671	

HTMT: heterotrait–monotrait matrix. For appropriate discriminant validity, all HTMT values need to be <0.90.

Following the guidance of Sarstedt et al. [75], it was necessary to evaluate the collinearity of the outer model in the subsequent analysis phase. To accomplish this, we computed the VIF (variance inflation factor) values for each reflective item, which are expected to be under 10 [70,76]. Our results revealed that all variables had VIF values between 1.897 and 4.168, which fell below the 10 threshold. Consequently, the data did not exhibit any issues with multicollinearity. Subsequently, we utilized a bootstrap analysis technique to scrutinize the suggested hypotheses and determine their corresponding t-values and *p*-values' significance level.

5.2. Hypotheses Testing (Inner Model Assessment)

Once the validity of the outer model was confirmed, the inner model paths were evaluated using PLS-SEM for hypothesis testing. The goodness of fit of the inner model was assessed by employing several criteria recommended by the authors of [70,73,77]. Table 5 illustrates that our model met the necessary conditions to confirm its adequate fit and predictive power. The Q^2, SRMR, R^2, and NFI scores surpassed the prescribed thresholds. This allowed us to conduct a more in-depth examination of the proposed hypotheses in the study. Smart PLS3 software was employed, utilizing a bootstrapping repetition of 5000 to calculate the regression weights (β), t-statistics, and significance levels (P) of the direct, indirect, and moderating effects. A total of five hypotheses were evaluated, including three direct hypotheses, one mediating effect, and one moderating effect, as outlined in Table 5.

Table 5. Inner model results (study hypotheses).

Hypotheses	β	t-Value	*p*-Values	Results
Direct Paths				
H1—Farm-to-fork → Sustainable agricultural practices	0.347	4.763	0.000	Confirmed
H2—Farm-to-fork → Environmental sustainability	0.654	18.740	0.000	Confirmed
H3—Environmental sustainability → Sustainable agricultural practices	0.381	6.495	0.000	Confirmed
Indirect mediating Paths				
H4—Farm-to-fork → Environmental sustainability → Sustainable agricultural practices	0.249	5.564	0.000	Confirmed
Moderating Effects				
H5—Perceived economic benefit × Environmental sustainability → Sustainable agricultural practices	0.193	3.247	0.001	Confirmed

The R^2 values for sustainable agricultural practices and environmental sustainability surpassed the suggested cut-off point of 0.10, and their Q^2 values (0.378 and 0.326, respectively) surpassed the suggested threshold value of 0.0.

Drawing from the findings depicted in Figure 2 and Table 5, the farm-to-fork (FTF) concept had a significant and positive impact ($p < 0.001$) on both sustainable agricultural practices (β = 0.347, t = 4.763, and $p < 0.000$) and environmental sustainability (β = 0.654, t = 18.740, and $p < 0.000$), giving support to H1 and H2. The results also indicated that environmental sustainability positively and significantly influenced sustainable agricultural practices (β = 0.381, t = 6.495, and $p < 0.000$), confirming H3. Moreover, the variable of environmental sustainability mediated the relationship between farm-to-fork (FTF) and sustainable agricultural practices (β = 0.249, t = 5.564, and $p < 0.000$), signaling that H4 could be accepted.

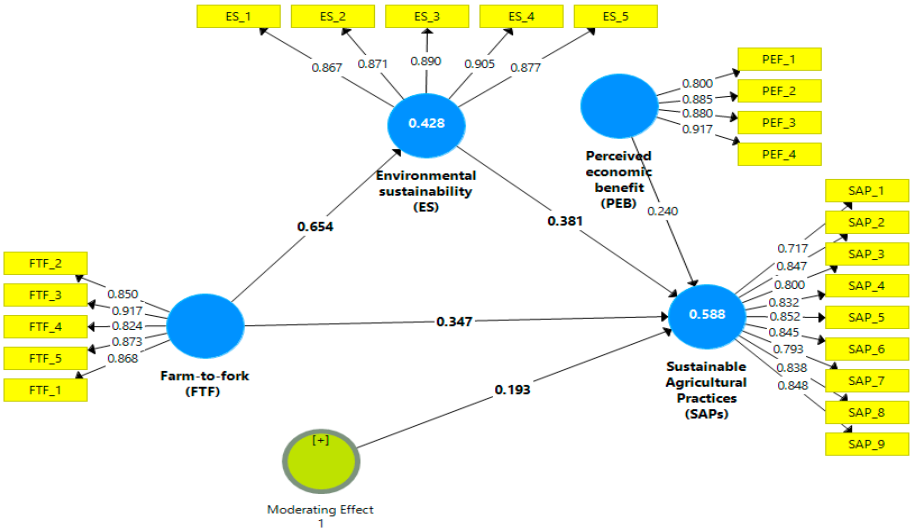

Figure 2. The study model. FTF is positively related to SAPs (β = 0.347) and ES (β = 0.654), and ES is positively associated with SAPs (β = 0.381) and mediated the relationship between FTF and SAPs (β = 0.249). Moreover, the PEB moderated the effect of ES on SAPs (β = 0.193).

The examination of the moderating effects indicated a noteworthy influence of the perceived economic benefit on the relationship under investigation, as demonstrated in Figure 2. Particularly, the Smart-PLS analysis displayed that the perceived economic benefit enhanced the significant influence of environmental sustainability on sustainable agricultural practices (β = 0.193, t = 3.247, and $p = 0.001$), indicating support for H5.

6. Discussion and Implication

Because developing countries generally have extensive rural residents who are highly dependent upon farming, creating connections between tourism and agriculture holds tremendous importance for host destinations, especially with about one-third of all expenditures of tourism and hospitality being directed toward food products. Therefore, the farm-to-fork (FTF) orientation would need to boost reciprocal and practical partnerships within this network [51]. Nonetheless, some scholars have indicated that there is a noteworthy lack of studies addressing this link [47]. Therefore, the results of our study reached their aims and purposes by adding to the current knowledge on agriculture-tourism partnerships, specifically in the context of sustainable development in the Middle East (an area that has yet to receive much attention) and theoretical expansion through the suggested model. Our results showed that the farm-to-fork (FTF) approach positively impacts sustainable agricultural practices (H1). Here, mainly, several scholars emphasized the need to adopt initiatives that work for short food supply chains, such as the farm-to-fork (FTF) approach, as a main tool to back and support the local economy, relink producers and customers,

and promote sustainable development in agrarian destinations [78–81]. According to the social embeddedness theory, Hinrichs [82] argues that the farm-to-fork (FTF) approach as a tool to reach the direct-to-customer markets promotes a feeling of connectedness that can support sustainable agriculture practices. The reasoning is that when farmers (producers) and customers establish intimate social ties, farmers are more likely to integrate customer feedback linking to product quality, environmental factors, animal welfare, and food safety. Hotels and restaurants also can play an increasing role in marketing local food and culinary products to promote the rural destination's identity and attract visitors, create social and reciprocal links in their local neighborhood, engage in environmental and green initiatives and movements such as sustainable agricultural practices, and thus, boost environmental sustainability in these destinations [83–85]. In line with this, our study proved that the farm-to-fork (FTF) concept positively affected environmental sustainability in agricultural destinations (H2). On the same statistical path, environmental sustainability has a positive effect on sustainable agricultural practices (H3). Here, Roe et al. [86] argued that any degradation in environmental parameters caused by tourism-related activities in rural destinations would thus pose an increased danger to the sustainability of such rural regions, including agricultural practices, and vice versa.

The study aimed to test whether or not environmental sustainability mediates the relationship between the farm-to-fork (FTF) approach and sustainable agricultural practices (H4). The results of the study, which also confirm the aforementioned three hypotheses, exposed that environmental sustainability was certainly a mediator between the farm-to-fork (FTF) approach and sustainable agricultural practices. The farm-to-fork (FTF) approach aims to monitor the environmental impact of food and rural products throughout their lifecycle, including factors such as energy and water usage and pollution during production, to educate consumers about the environmental sustainability of their food choices. This encourages farmers to adopt sustainable agricultural practices [64]. According to Abbas and Hussien's study, which was conducted in Egypt, green restaurants implement the principles of the FTF approach by adhering to green supply management practices, for example, the commitment to support the local community by purchasing local organic products and incorporating local green food ingredients in their menus [87]. This, thus, supports local environmental, social, and economic sustainability and encourages farmers to adopt sustainable agricultural practices.

Finally, PLS-SEM findings supported the moderation effects of the perceived economic benefit on the links between environmental sustainability and sustainable agricultural practices (H5). It is progressively more difficult for small-scale farmers to produce value and capital to adopt sustainable agricultural practices; thus, economic factors may be the primary determinant in adopting these practices [84]. Thus, sustainable agriculture practices must be "economically viable, environmentally safe, and socially fair" to succeed in being sustained over a long period [88,89]. Furthermore, according to rationality theory, when farmers decide whether or not to embrace sustainable agricultural techniques, they weigh up the personal and economic benefits that may result from this adoption. Thus, we conclude that the economic benefits generated from shortening the supply chain between farmers and "forks" succeed in achieving the advantages of environmental sustainability in the local community, which, in turn, motivates and enables farmers financially to invest in sustainable agricultural practices because green products that carry with them the principles of sustainable development (environmental, social, and economic) are accepted by the "forks" in light of the growing green trends in the tourism and hospitality sector.

7. Conclusions

This study has shed light on the vital relationship between farm-to-fork (FTF) sourcing, sustainable agriculture, perceived economic benefit, and environmental sustainability in the agriculture–tourism partnership framework in the Egyptian context. The data were collected from 298 farmers in Luxor and Aswan, located in upper Egypt, and analyzed via PLS-SEM. The research findings have shown that farm-to-fork (FTF) sourcing has a positive

impact on sustainable agriculture practices and that both perceived economic benefit and environmental sustainability have moderating and mediating roles in these relationships, indicating that this approach has the potential to promote sustainable agriculture practices and reduce the carbon footprint of the food supply chain. Furthermore, the study has demonstrated that perceived economic benefit plays a moderating role in the relationship between environmental sustainability and sustainable agriculture practices. This suggests that efforts to promote farm-to-fork (FTF) sourcing should focus on highlighting the economic benefits of this approach, in order to encourage the greater adoption of and support for sustainable agriculture. The study has also revealed that environmental sustainability mediates the relationship between farm-to-fork (FTF) sourcing and sustainable agriculture practices. This finding underscores the importance of sustainable agriculture in enhancing the economic benefits of this approach, and suggests that promoting sustainable agriculture can lead to greater economic benefits for both farmers and residents.

Overall, the findings of this study have important implications for Egyptian farmers, restaurant owners, and policymakers seeking to promote sustainable agriculture and reduce the food system's environmental impact. By emphasizing the economic benefits of farm-to-fork (FTF) sourcing and promoting sustainable agriculture, it may be possible to encourage the greater adoption of this approach and ultimately reduce the carbon footprint of the food supply chain.

In future research, it will be important to investigate how different policy interventions can be used to promote sustainable agriculture and support farm-to-fork (FTF) sourcing, and to explore the impact of these interventions on the broader food system. With continued research and advocacy, there is potential to establish a food system that is more sustainable and resilient, benefiting future generations. Finally, while farm-to-fork (FTF) practices are a valuable component of sustainable tourism, they should be integrated with other sustainable tourism practices (i.e., eco-friendly accommodations, sustainable transportation, and waste reduction and management) to maximize their impact and promote sustainability in the tourism industry.

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Data are available upon request from researchers who meet the eligibility criteria. Kindly contact the first author privately through e-mail.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A. The Study Measures

Appendix A.1. Farm-to-Fork (FTF) Concept

- The farm-to-fork (FTF) initiative is a helpful marketing tool for local agriculture products.
- Hotels and restaurants organize tourist visits to farms.
- Hotels and restaurants use local organic sustainable ingredients on their tables.
- Hotels and restaurants provide opportunities for cultural exchange between tourists and residents.

- Generally, generated agriculture–tourism partnerships through adopting the farm-to-fork (FTF) concept principles are positive.

Appendix A.2. Sustainable Agricultural Practices (SAPs)

To what extent do you carry out the following:

- Reincorporate crop residues back into the field.
- Utilize organic fertilizers as a substitute for chemical fertilizers.
- Enhance irrigation practices to ensure sustainable water management.
- Reduce the use of chemical fertilizers and pesticides by 50%.
- Implement the application of biochar as an alternative to chemical fertilizers.
- Integrate cover crops into crop rotation practices.
- Intercrops cover crops alongside existing crops.
- Plants cover crops in marginal farmland areas.
- Implement extended periods of fallow (ranging from 1 to 3 years), which can be employed to reduce the regularity or concentration of tillage processes and conserve soil resources.

Appendix A.3. Environmental Sustainability (ES)

- The preservation and appreciation of our community's diverse natural environment are prioritized during tourism development.
- Tourism development in our community consistently ensures the safeguarding of wildlife and natural habitats.
- The protection of our community's natural environment is an ongoing commitment for present and future generations.
- Tourism development in our community actively promotes and upholds positive environmental ethics.
- The development of tourism in our community harmoniously coexists with and respects the natural environment.

Appendix A.4. Perceived Economic Benefit (PEB)

Hotels through the farm-to-fork (FTF) concept

- Significantly contribute to the economic growth of our community.
- Provide benefits that extend beyond the tourism industry in our community.
- Bring in fresh sources of income to our communities.
- Produce substantial tax outcomes for the local government.

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