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# Who Is Going Green? Determinants of Green Investment Intention in the Saudi Food Industry

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**Abstract:** The Kingdom of Saudi Arabia (KSA) has witnessed major transformations in social, economic, and environmental aspects since the inauguration of Saudi Vision 2030 in April 2016. In alignment with this, the leadership of KSA has inaugurated green initiatives that pave the way for green investment opportunities in different industries within KSA. However, there was limited, if any, research about green investment intention and behaviour in KSA. This research tests an expanded model of the Theory of Planned Behaviour (TPB) to investigate the determinants of green investment intention in the Saudi food industry. A questionnaire survey was electronically directed to 550 fresh agricultural and food sciences graduates in public KSA universities. The results of PLS-SEM showed significant positive influences of the attitude, perceived behavioural control, green investment knowledge, and green consumption commitment on the green investment intention of potential investors. However, the results confirmed a negative influence of subjective norms on green investment intention. The results also confirmed a moderating role of religiosity on the relationship between attitude, perceived behavioural control, green consumption commitment, and green investment intention. The results send some important messages to scholars and policymakers in higher education regarding the foundation of green investment among their graduates, which are elaborated.

**Keywords:** green investment intention; theory of planned behaviour; religiosity; green consumption commitment; green investment knowledge



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## 1. Introduction

The global food system is facing several challenges related to food security, environmental sustainability, social equity, and economic viability [1–3]. These challenges are driven by the increasing demand for food due to increasing population, water scarcity, climate change, changes in consumption patterns, and the depletion of natural resources [1]. To address these challenges, sustainable food production practices have been developed to reduce environmental impacts and improve the livelihoods of smallholder farmers. In the context of Saudi Arabia, the food industry is an important sector that plays a significant role in the country's economy [4]. However, the industry is faced with numerous environmental challenges that influence its sustainability, e.g., water scarcity, desertification, and land degradation [5]. Green investment intention has emerged as a viable strategy to promote sustainable food production practices in the Saudi food industry. The Saudi government has launched several initiatives to promote the eco-system. These initiatives provide financing and incentives for sustainable agriculture, which can attract green investments and promote sustainable food production practices. This research investigates the determinants of green investment intention to promote sustainable agricultural food production in the Saudi food industry. In the context of the Saudi food industry, green investments can promote sustainable food production by financing the adoption of sustainable practices

such as conservation agriculture and organic farming. These practices can promote soil health, increase crop yield, reduce greenhouse gas emissions, and enhance biodiversity.

The initiation of the Kingdom of Saudi Arabia (KSA) Vision 2030 promoted considerable transformations in the social, economic, and governmental landscape [6]. The Saudi Vision 2030 is a comprehensive national improvement strategy with three main objectives: a vibrant economy, a thriving society, and an ambitious nation [7]. The Vision has led to enormous changes in the economy's operation by promoting non-oil sectors instead of comprehensively relying on oil [7]. The Vision focuses on generating a diverse, thriving, and sustainable economy to supplement the quality of lives of citizens [7]. Environmental sustainability is one of the key issues in the Vision. Hence, there are several green initiatives promoted by the leadership of KSA. This was started by the King Salman Renewable Green Energy initiative in 2016, the National Renewable Energy Program in 2017, the launch of the National Environment Strategy in 2108, and the "Let's Make it Green" Campaign in 2020 [8,9]. In 2021, The Middle East Green Initiative and Saudi Green Initiative were inaugurated by the Crown Prince and Prime Minister of KSA, Mohamed Bin Salman [8,9]. These initiatives aim to create a greener future for all and meet the challenges of climate change [8]. The Saudi Green Initiative has three main objectives, i.e., reducing emissions, greening Saudi, and protecting the land and sea [9]. The first objective is to reduce emissions by accelerating the green energy transition in KSA and mitigating the impacts of climate change [4]. The key performance indicator is net zero emissions by 2060 [10]. The second objective is to rehabilitate 40 million hectares of land by planting 10 billion trees across KSA [11]. The third objective is to protect 30% of KSA's land and sea [12]. The Saudi leadership has a clear vision to champion climate actions in KSA and abroad through SGI and MGI, respectively. However, these initiatives are in progress, and achievement reports have not been announced yet.

Despite the clear vision of KSA's leadership, green investment in KSA is still in its infancy stage. The Crown Prince argued that these green initiatives paved the way for new investment opportunities in green KSA, which need collaboration from all stakeholders. Green investment is vital to ensure the proper implementation and success of these national initiatives and advance the national agenda. Hence, there is a need to understand the determinants of green investment intention in KSA to support the Saudi Vision 2030. This is especially true for the Saudi food industry since KSA suffers from tough weather and barren land; hence, it relies heavily on imports to meet the need of its citizens. One of the objectives of the Saudi government is to ensure food security for the Kingdom, which can be achieved while ensuring environmental sustainability [6]. The Saudi food market was USD 14.16 billion in 2022 and is expected to grow to USD 30.47 billion by 2029 [13].

Green investment refers to investment activities that primarily conserve natural resources and adopt environmentally friendly business practices [14]. This type of investment has positive consequences on the environment, such as reducing greenhouse gas and air pollution while maintaining the quality of production and consumption [14]. Green investment adopts new initiatives and technologies that ensure environmental sustainability [15]. Green investment is a key factor in the growth of renewable energy in China [15]. Green investment is boosted by political support and economic growth [15], which is the case of KSA, with economic prosperity. Despite the importance of green investment, studies on the antecedents of green investment intention remain limited in general, and in developing and Islamic countries, in particular, remain very limited [16]. This study bridges this knowledge gap and investigates the determinants of green investment in the KSA food industry that are critical to the economy and Saudi Vision 2030. This also contributes to the achievement of sustainable development, which also becomes critical in today's business environment [17–19].

The current study tests an expanded model of the Theory of Planned Behaviour (TPB) [20] to investigate the causes of green investment intention in the KSA food industry. The study tests the influence of the three determinants of green TPB: attitude towards behaviour (ATB), subjective norms (SNs), perceived behavioural control (PBC), as well as

the effect of green investment knowledge [16] and green consumption commitment [21] of the agricultural and food sciences graduates in KSA universities on their green investment intention in the food industry. These graduates are expected to be potential investors. The study tests the moderation effect of religiosity on such links. The role of religiosity was considered because KSA is categorised as an Islamic society [22]; hence, this study examined whether this would have an impact on the above-mentioned relationships. The level of green investment knowledge and sustainable agriculture practices can influence green investment intention [16]. Investors' knowledge and understanding of sustainable agriculture practices can enhance their willingness to invest in environmentally sustainable projects. Therefore, promoting awareness and education about sustainable agriculture practices can increase green investment intention in the Saudi food industry. Moreover, consumers' willingness to choose sustainably produced food can create a demand for sustainable farming practices [21], which can incentivise farmers to adopt sustainable practices.

To fulfil the purpose of this research, the next section reviews the literature in relation to the effect of TPB, i.e., ATB, SNs, and PBC, as well as green consumption commitment and green investment knowledge on green investment intention. It also considers the moderation role of religiosity in this relationship. The next section presents the research methods adopted for data collection and data analysis. The results of the collected data are then presented and discussed. The implications of the study are highlighted, and the study conclusion is presented.

## 2. Literature Review

### *2.1. Theory of Planned Behaviour and Green Investment*

Ajzen [20] established the TPB framework to enhance the early developed Theory of Reasoned Action (TRA) by adding PBC as an originator of behavioural intention. TPB argues that ATB, SNs, and PBC are positively correlated with an individual's intention or motivation to undertake a certain behaviour. It also argues that behavioural intention is the main determinant of an individual's definite behaviour. ATB is the assessment of the behaviour of interest, positively or negatively. Positive ATB is associated with behavioural intention [21]. SNs include the influence perceived by an individual's network or people surrounding him/her, such as their peers, family, and teachers [20]. PBC refers to an individual's perceptions of his/her ability to perform a behaviour of interest [21]. Behavioural intention refers to the motivation or readiness of an individual to perform a given behaviour [20]. The current study adopts TPB for understanding investment intention among university graduates in a green context. TPB framework has been adopted for examining human behaviour in different contexts, such as entrepreneurial intention among higher education [23,24], food waste intention [25], excessive food buying [26], fast food buying intention [27], healthy food item choices [28], state-branded food product purchase [29], or consumer behaviour regarding organic menus [30].

The TPB framework was also extensively adopted to predict individual green purchase intentions and behaviour. For example, Paul et al. [31] used TPB to examine customers' green purchase intentions in India and found that both ATB and PBC have a positive effect on customers' intentions to purchase green items, whereas SNs have no effect on green purchase intention. Moreover, Chen and Tung [32] tested TPB to predict customers' intention to stay at green hotels in Taiwan. The results showed that ATB, SNs, and PBC have a positive effect on customers' intentions to choose green hotels. Similarly, Han et al. [33] reported the same findings among US customers. The study of Moon et al. [34] found that green ATB and green SNs explained a substantial amount of variance in green purchase intentions among university students in Pakistan [34]. Judge et al. [35] predicted consumers' intention to buy housing with sustainability certification using TPB. The results confirmed that TPB variables predict consumers' intention to buy housing with sustainability certification.

In the green investment context, there were some attempts by scholars to investigate the drivers of green investment. For example, the study of Chan et al. [36] used TPB to test the green investment intention among undergraduate students in Kuala Lumpur,

Malaysia. The findings showed that the three variables of TPB (ATB, SNs, PBC) are predictors of green investment intention. A study on investment intention in wind energy projects in Germany [37] found that SNs and PBC positively affect wind energy investment intention, whereas ATB has no effect on green investment intention. Yee et al. [38] examined investment intention toward renewable energy in Malaysia and found that TPB constructs have an indirect effect through the evaluation of the regulatory framework. A recent study on the determinants of green investment intention in Muslim nations, i.e., Malaysia [17], showed that ATB and PBC are among the key determinants of green investment intention. Based on these arguments and the TPB framework, we assume hypotheses (H):

**H1:** *Agricultural and food science graduates' green attitudes positively affect their green investment intention.*

**H2:** *Agricultural and food science graduates' green subjective norms positively affect their green investment intention.*

**H3:** *Agricultural and food science graduates' green perceived behavioural control positively affects their green investment intention.*

### *2.2. Green Consumption Commitment, Green Knowledge, Green Investment Intention*

Research [16,21] has shown that there are other variables that could be determinants of green investment intention, such as green consumption commitment and green investment knowledge. Green consumption commitment refers to an individual's preferences for products or services with green characteristics [39]. Hence, those individuals with green consumption commitment are ready to devote more time and money to these green products and/or services [40]. Previous research found that individuals who pay more attention to environmental issues are more likely to be more concerned about green products and services [41]. However, a high food consumption culture among consumers encourages negative ecological practices such as food waste [25] or excessive buying behaviour [26]. Recent research [21] on green entrepreneurship intention found a moderating effect of green consumption commitment on the relationships between green entrepreneurship intention and actual behaviour. Other research found that consumption profile influences wind energy investment intention as a green source of energy [37].

A relationship was also established between knowledge of green investment and green investment intention and behaviour [16]. Recent research on risky investment intention [42] in KSA has shown that financial knowledge has a direct effect on risky investment intention among university graduates and an indirect influence through TPB constructs. Another study [43] found a significant effect of investment awareness on investment intention. This investment knowledge of graduates is shaped by university education support [23,24]. A recent study [17] found that knowledge of green investment is a predictor of green investment among university students in Malaysia. Thus, we assume that:

**H4:** *Agricultural and food science graduates' green consumption commitment positively affects their green investment intention.*

**H5:** *Agricultural and food science graduates' knowledge of green positively affects their green investment intention.*

### *2.3. The Role of Religiosity*

Religiosity refers to religious values and ideals that many individuals or groups hold and practice [44]. It also can be defined as a commitment to a certain religion [45]. KSA is categorised as an Islamic society, where its citizens believe that the Holy Quran is "the Message of God" and his prophet Mohamed is "the Messenger of Islam". Islam is one of the heavenly religions that guide the attitude and behaviour of individuals and groups [46]. There is no doubt that religiosity drives human behaviour toward positive attitude and

practice as the orders of God, whom they believe and trust [47]. It was confirmed that religiosity guides an individual's ethical practices [48] and lifestyle [49].

There is growing research on the role of religiosity in encouraging positive environmental practices. While the study of Liobikienė et al. [50] found no link between religiosity and naturally friendly behaviour, another study [51] found that the doctrinal ethical tenet of religiosity guides consumers to nature conservation. It was confirmed that religiosity positively influences the attitude of owner–managers toward environmental sustainability [52]. Religiosity was found to be associated with positive environmental behaviour, such as lower rates of smoking initiation [53]. Religiosity has a significant influence on pro-environmental behaviour [54]. Research confirmed that Islamic values predict consumers' green buying intention and behaviour [55]. Wang et al. [56] found that religiosity has an indirect influence on pro-environmental intention through frugality consciousness and connectedness to nature. Osman et al. [17] found that Islamic religious values are the most significant predictor of green investment intention among university students in Malaysia. This study makes a first attempt to test the moderation effect of religiosity on the link between determinants and green investment intention (Figure 1).

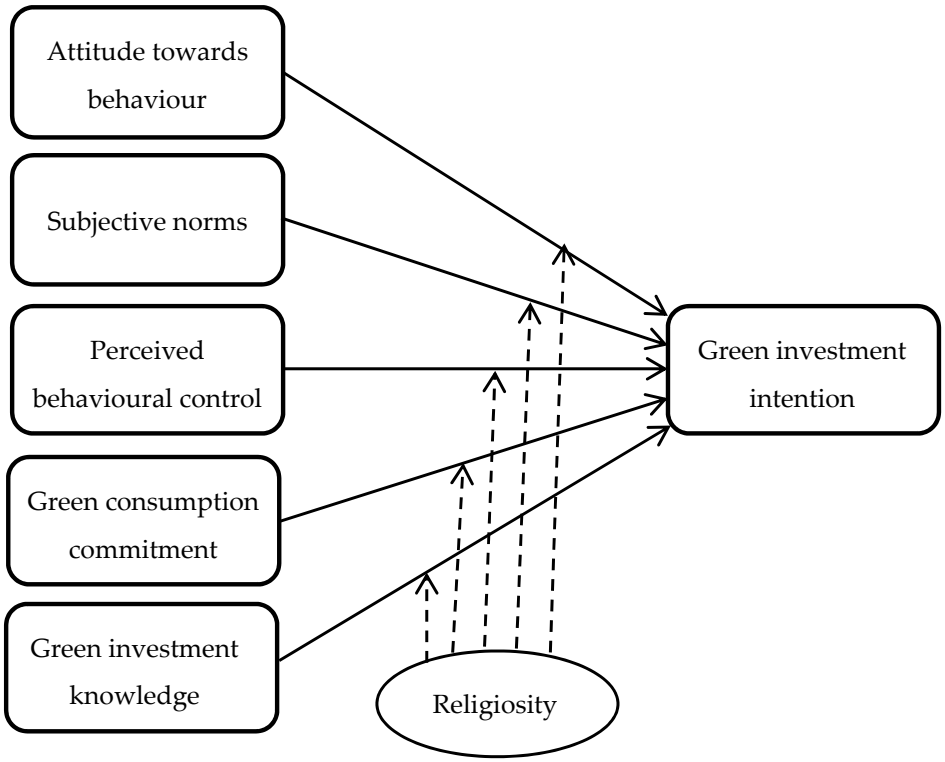


**Figure 1.** Determinants of green investment intentions model.

As highlighted earlier in the introduction, the current study draws on the Theory of Reasoned Action (TRA) and TPB [20] to test an expanded model of TPB. In this context, the study tests the moderating effect of religiosity on the relationship between TPB constructs, green investment knowledge, and green consumption intention on green investment intention. We hypothesise that:

**H6:** *Religiosity moderates the relationship between agricultural and food science graduates' attitude and their green investment intention.*

**H7:** *Religiosity moderates the relationship between agricultural and food science graduates' subjective norms and their green investment intention.*

**H8:** *Religiosity moderates the relationship between agricultural and food science graduates' perceived behavioural control and their green investment intention.*

**H9:** *Religiosity moderates the relationship between agricultural and food science graduates' green consumption commitment and their green investment intention.*

**H10:** *Religiosity moderates the relationship between agricultural and food science graduates' knowledge of green investment and their green investment intention.*

## 3. Methods

### *3.1. Study Measures*

The survey form has three parts. The initial part explains the goals of the study and offers directions for filling out the form. The second part solicits personal data from the respondents, such as age and gender. Lastly, the third part includes the primary research inquiries, which employ a 7-point Likert scale, where 1 means "strongly disagree" and 7 means "strongly agree". We assessed the intention towards investing in green projects by utilising three modified statements from Chen's [57] research. The participants were informed to express their level of concurrence or disagreement with statements related to their willingness to regularly invest in eco-friendly (green) projects and encourage others to do the same. Additionally, they were asked about their plans to invest in green projects in the future. The items that measure GII showed good reliability with a value equal to 0.891. The measures of TPB typically include attitude and subjective norm [17,18]. These measures are widely employed in different fields and are usually assessed through self-reported scales where individuals evaluate the agreement or disagreement with the questions related to each construct. The measures were slightly modified to match the study context, where green attitude was measured using three items from Mohd Suki [58] and showed good internal consistency in our study (a = 0.972). Similarly, green subjective norms were measured using three items derived and modified from Gopi and Ramayah [59] (a = 0.969). Green PBC was measured using four items (a = 0.959) as employed by Amin, Rahman, and Razak [60].

From Jaffar and Musa [61], four items that measure green investment knowledge were employed in our study and showed good and adequate reliability with a score equal to 0.987. Similarly, green consumption commitment was measured using four items adopted from Zeithaml et al. [62]. Finally, religiosity as a moderating variable was measured using three items (a = 0.836) from Jaafar and Musa [61]. All measures with related items are presented in Table 1.

**Table 1.** Respondents descriptions.

| Respondents Profile ($n$ = 550) | | Frequencies | % |
|---|---|---|---|
| University name | University of Mohammad ibn Saud Islamic | 165 | 30% |
| | University of King Faisal | 137 | 25% |
| | University of King Khaled | 137 | 25% |
| | University of Umm Al Qura | 111 | 20% |
| Gender type | Female | 281 | 51% |
| | Male | 269 | 49% |
| Age range | <1 Years | 165 | 30% |
| | 21–<25 Years | 358 | 65% |
| | >25 Years | 27 | 05% |

The questionnaire underwent testing by university professors (15) and graduates (13) to confirm its consistency, clarity, and user-friendliness. We implemented measures to ensure the confidentiality of respondents' information. Since research surveys are susceptible to Common Method Variance (CMV), Harman's single-factor was undertaken with Exploratory Factor Analysis (EFA) to discover potential CMV. The EFA findings revealed that CMV was not a problem since one single variable clarified only 41% of

the variance in the endogenous one, which is below the 50% threshold recommended by Nunnally [63].

### *3.2. Participants and Methods of Data Collection*

The research team conducted a random survey of graduates in agriculture and food science from national universities located in various provinces of the Kingdom of Saudi Arabia. A digital survey was distributed to national universities. The team leveraged their connections with professors and lecturers to disseminate the survey via official university emails and other social networking sites (i.e., WhatsApp groups). Contribution was voluntary, and the questionnaire introduction clearly communicated its purpose and the privacy of all collected data. We sent out a survey to graduates who may be interested in investing, and they received the survey in November and December 2022. A total of 600 forms were distributed, and 537 had usable responses, resulting in a total of 550 (537 + 13 pilot study graduates) with a response rate of 91.6%. We did not have any issues with late answers. A *t*-test showed no significant differences in the means, which confirmed that there was no bias in the responses [64].

### *3.3. Data Analysis Procedures*

This research utilised PLS-SEM with the SmartPLS vs. 4-software [65]. PLS-SEM is considered a non-parametric technique that calculates the variance in latent dimensions [66] and is commonly used in management science. Smart PLS-SEM is usually employed to investigate the connections between different variables. Following Leguina's [67] suggestion, we evaluated the suggested theoretical model in two main stages: (1) first for convergent and discriminant validity, then (2) for hypothesis confirmation.

## **4. Research Results**

### *4.1. Descriptive Analysis Results*

The surveyed students had almost equal representation of males and females, with 90% of them between the ages of 17 and 25. A total of 30% were from Mohammad ibn Saud Islamic University, 25% of the participants were enrolled at King Faisal University, 25% at King Khaled University, and 20% at Umm Al-Qura University. The answers to the survey questions varied, with mean scores ranging from 4.33 to 5.60 and standard deviation values between 1.083 and 1.818, which suggests that the responses were not grouped around the mean. Additionally, the variance inflation value was lower than 0.5 for the survey items, meaning that multicollinearity was not a concern.

### *4.2. Outer Model Evaluation*

To ensure the validity and reliability of the research, a number of benchmarks (indices) were employed per the recommendations of Hair et al. [66] and Kline [68], including the composite reliability (CR) value, internal consistency reliability (a) value, convergent validity index, and discriminant validity index.

#### 4.2.1. Convergent Validity Results

To evaluate the convergent validity of the employed scale, a number of criteria were used, including Cronbach's alpha (a), reliability, composite reliability (C.R.), loadings, and Average Variance Extracted (AVE). As shown in Table 2, the C.R. and (a) values for all the scales employed surpassed the threshold value of 0.7, indicating an appropriate level of internal reliability [66]. These values were as follows: DII (a = 0.81, C.R = 0.82); green attitude (a = 0.97, C.R = 0.97); green subjective norms (a = 0.96, C.R = 0.97); green perceived behaviour control (a = 0.95, C.R = 96); green investment knowledge (a = 95, C.R = 98); green consumption commitment; and religiosity (a = 0.97, C.R = 0.97).

**Table 2.** Psychometric properties.

| Abbr. | SFL | α | C.R | AVE |
|---|---|---|---|---|
| Green Attitude | | 0.972 | 0.975 | 0.946 |
| In my opinion, opting for green investments is a smart choice. | 0.962 | | | |
| I believe that the performance of green investments is usually dependable. | 0.985 | | | |
| I have faith that the assertions made about green investments are usually credible. | 0.971 | | | |
| Green investment intention | | 0.819 | 0.820 | 0.734 |
| I plan to make frequent investments in green projects. | 0.868 | | | |
| I intend to promote green investments to my friends and family. | 0.848 | | | |
| I have plans to invest in green projects in the near future. | 0.854 | | | |
| Green consumption commitment | | 0.973 | 0.973 | 0.925 |
| My future goal is to create eco-friendly products. | 0.980 | | | |
| I am keen to suggest green products to my friends and acquaintances. | 0.971 | | | |
| I speak positively about environmentally-friendly products to others. | 0.973 | | | |
| I would motivate others to develop green products. | 0.923 | | | |
| Green investment knowledge | | 0.987 | 0.988 | 0.963 |
| I am aware of the availability of eco-friendly investments. | 0.990 | | | |
| I engage in green investments because they align with my environmental values. | 0.984 | | | |
| I invest in green projects because they offer greater environmental advantages compared to other options. | 0.990 | | | |
| Green investments have the potential to yield long-term benefits. | 0.961 | | | |
| Green perceived behavioural control | | 0.959 | 0.967 | 0.891 |
| I am capable of taking part in green investments. | 0.920 | | | |
| It would be effortless for me to engage in green investments | 0.956 | | | |
| I trust my ability to select the type of eco-friendly investment that suits me. | 0.947 | | | |
| I am interested in investing in green initiatives. | 0.952 | | | |
| Religiosity | | 0.836 | 0.860 | 0.753 |
| Shariah-compliant financial institutions and organisations that offer green investments are available. | 0.881 | | | |
| Green investments provided by Islamic financial institutions and agencies do not involve interest-based transactions. | 0.913 | | | |
| My religious beliefs inspire me to partake in eco-friendly investments. | 0.806 | | | |
| Green subjective norms | | 0.969 | 0.973 | 0.942 |
| The majority of individuals whose perspectives I esteem would endorse my involvement in green investments. | 0.975 | | | |
| People who hold significance in my life believe that I should engage in eco-friendly investments. | 0.982 | | | |
| My loved ones, who hold great importance in my life, support my decision to invest in green initiatives. | 0.954 | | | |

The research constructs were found to be reliable, as each factor had an SFL "standardised factor loading" value that was greater than 0.70. Convergent validity was also established by assessing AVE values to a cutoff point of 0.5 [69]. To test the scale discriminant validity, the Fornell–Larcker criterion, the cross-loading matrixes, and the heterotrait–monotrait method ratios (HTMT) were used, as recommended by Leguina [67].

#### 4.2.2. Discriminant Validity Results

To test the discriminant validity of the research factors, cross-loadings, the Fornell–Larcker criterion, and the heterotrait–monotrait ratio were used. Each latent unobserved variable's outer loading was higher than its cross-loading, as shown in Table 3 [67], indicating that discriminant validity was established. Furthermore, Table 4 shows that the AVE scores on the diagonal were higher than the inter-variable correlations, giving more evidence of adequate discriminant validity [68]. Lastly, the HTMT scores should be lower than the 0.90 cutoff point, as recommended by Leguina [67], and the reference value in Table 4 was satisfied. All of these results confirmed that the research constructs have high discriminant validity, and the hypotheses were then evaluated with the outer structural model.

**Table 3.** Cross-loading matrix.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| 1. Green attitude | | | | | | | |
| G.Attude_1 | 0.96 | 0.11 | 0.26 | 0.03 | 0.22 | 0.23 | −0.01 |
| G.Attude_2 | 0.99 | 0.06 | 0.24 | −0.04 | 0.18 | 0.14 | −0.06 |
| G.Attude_3 | 0.97 | 0.05 | 0.23 | −0.03 | 0.19 | 0.12 | −0.07 |
| 2. Green investment intention | | | | | | | |
| G.Invst_1 | 0.19 | 0.38 | 0.87 | 0.26 | −0.09 | 0.38 | 0.40 |
| G.Invst_2 | 0.24 | 0.31 | 0.85 | 0.23 | −0.19 | 0.36 | 0.28 |
| G.Invst_3 | 0.21 | 0.43 | 0.85 | 0.40 | −0.06 | 0.27 | 0.32 |
| 3. Green consumption commitment (G_Comtt) | | | | | | | |
| G_Comtt_1 | 0.09 | 0.97 | 0.42 | 0.33 | −0.07 | 0.30 | 0.34 |
| G_Comtt_2 | 0.06 | 0.92 | 0.43 | 0.33 | −0.15 | 0.21 | 0.33 |
| G_Comtt_3 | −0.02 | 0.32 | 0.34 | 0.99 | 0.15 | 0.26 | 0.41 |
| G_Comtt_4 | −0.02 | 0.30 | 0.35 | 0.98 | 0.10 | 0.21 | 0.41 |
| 4. Green investment knowledge | | | | | | | |
| G_Invst_knw_1 | 0.08 | 0.98 | 0.42 | 0.29 | −0.14 | 0.26 | 0.33 |
| G_Invst_knw_2 | 0.06 | 0.97 | 0.41 | 0.32 | −0.07 | 0.28 | 0.34 |
| G_Invst_knw_3 | 0.09 | 0.97 | 0.42 | 0.33 | −0.07 | 0.30 | 0.34 |
| G_Invst_knw_4 | 0.06 | 0.92 | 0.43 | 0.33 | −0.15 | 0.21 | 0.33 |
| 5. Green perceived behavioural control | | | | | | | |
| Per_Beh_1 | 0.14 | 0.25 | 0.32 | 0.28 | 0.05 | 0.92 | 0.19 |
| Per_Beh_2 | 0.16 | 0.28 | 0.35 | 0.27 | 0.03 | 0.96 | 0.22 |
| Per_Beh_3 | 0.18 | 0.25 | 0.41 | 0.16 | −0.12 | 0.95 | 0.19 |
| Per_Beh_4 | 0.17 | 0.25 | 0.40 | 0.19 | −0.08 | 0.95 | 0.21 |
| 6. Religiosity | | | | | | | |
| Reliogisty_1 | −0.05 | 0.26 | 0.28 | 0.41 | −0.15 | 0.13 | 0.88 |
| Reliogisty_2 | −0.01 | 0.34 | 0.40 | 0.34 | −0.12 | 0.20 | 0.91 |
| Reliogisty_3 | −0.07 | 0.29 | 0.33 | 0.33 | −0.22 | 0.22 | 0.81 |
| 7. Green subjective norms | | | | | | | |
| Subj_Nrms_1 | 0.21 | −0.13 | −0.12 | 0.11 | 0.98 | −0.03 | −0.17 |
| Subj_Nrms_2 | 0.18 | −0.13 | −0.14 | 0.10 | 0.98 | −0.07 | −0.20 |
| Subj_Nrms_3 | 0.20 | −0.06 | −0.10 | 0.18 | 0.95 | −0.01 | −0.14 |

**Table 4.** Fornell–Larcker matrix and HTMT matrix.

| | | Fornell–Larcker Criterion | | | | | | | HTMT Results | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | a | b | c | d | e | f | g | a | b | c | d | e | f | g |
| a. | Green Attitude | 0.97 | | | | | | | | | | | | | |
| b. | Green Consumption Commitment | 0.07 | 0.96 | | | | | | 0.07 | | | | | | |
| c. | Green Investment Intention | 0.25 | 0.43 | 0.85 | | | | | 0.28 | 0.48 | | | | | |
| d. | Green Investment Knowledge | −0.01 | 0.32 | 0.34 | 0.98 | | | | 0.03 | 0.33 | 0.38 | | | | |
| e. | Green Subjective Norms | 0.20 | −0.11 | −0.12 | 0.12 | 0.97 | | | 0.20 | 0.11 | 0.14 | 0.13 | | | |
| f. | Perceived Behavioral Control | 0.17 | 0.27 | 0.39 | 0.23 | −0.03 | 0.94 | | 0.17 | 0.28 | 0.44 | 0.24 | 0.08 | | |
| g. | Religiosity | −0.04 | 0.34 | 0.39 | 0.41 | −0.18 | 0.21 | 0.86 | 0.05 | 0.38 | 0.46 | 0.45 | 0.20 | 0.23 | |

### *4.3. Inner Model Evaluation*

The study employed SmartPLS 4′s inner model to examine the hypotheses. The aim was to evaluate the capability of the study model to clarify and anticipate the variations in endogenous variables triggered by exogenous variables [69]. Additionally, to assess the model's goodness of fit (GoF), we utilised the equation introduced by Chin [70]. This equation computes GoF by obtaining the square root of the $R^2$ multiplied by the average of all AVE values. Our GoF analysis yielded a score of 0.59, which suggests a substantial level of model fit, as recommended by Wetzels et al. [71]. To confirm the goodness of fit (GoF) of the research model, the value of the endogenous variables should be at least 0.10.

The $R^2$ value of the endogenous latent variable GII in our study was 0.401, which exceeded the recommended scores and gave more evidence that the study model adequately fits the study's empirical data. Additionally, the Stone–Geisser Q2 statistic had a value of 0.376 for GII, which was more than zero, indicating an acceptable result [70]. Furthermore, the SRMR score should be lower than the value of 0.08, and the NFI value had to be greater than 0.90 to safeguard adequate model fit to the data [67].

The study yielded an SRMR value of 0.040; this result shows that the calculated residual value obtained by fitting the variance–covariance matrix of the proposed model to the observed sample data's variance–covariance matrix is less than the predetermined threshold of 0.08, as suggested by Hair et al. [66] and Kline [68]. Additionally, the NFI score surpassed the recommended threshold of 0.90, which indicates a good fit. Furthermore, the $f^2$ values, which quantify the change in $R^2$ after removing an exogenous variable, were also computed. The findings demonstrated that the exogenous variables had a minimal impact on the GII (green attitude, $f^2 = 0.093$; consumption commitment, $f^2 = 0.053$; green investment knowledge, $f^2 = 0.031$; green perceived behaviour control, $f^2 = 0.046$; and green subjective norms, $f^2 = 0.017$). This implies that removing any exogenous variables from the model would only result in a slight alteration in the main model, as suggested by Cohen [72].

Once a satisfactory model fit was established, a 5000 bootstrapping repetition was employed in SmartPLS4 to determine the path coefficient and *t*-value for the study's proposed interrelationships and moderation paths, which are presented in Table 5 and Figure 2. The study suggested and evaluated ten hypotheses, with five being direct relationships and the other five involving moderation. The PLS-SEM findings revealed that GII was positively and significantly influenced by green attitude ($\beta = 0.259$, $t = 6.327$, $p < 0.001$), green consumption commitment ($\beta = 0.221$, $t = 4.712$, $p < 0.001$), green investment knowledge ($\beta = 0.169$, $t = 4.559$, $p < 0.001$), and green perceived behaviour control ($\beta = 0.187$, $t = 5.389$, $p < 0.001$), hence corroborating hypotheses H1, H2, H3, and H4. However, contrary to expectations, subjective norms had a significant but negative effect on GII ($\beta = -0.111$, *t*-value = 2.740, $p < 0.001$), which resulted in the rejection of H5.

**Table 5.** Hypotheses evaluation.

| | Hypotheses | Beta (β) | *t*-Value | *p*-Value | Results |
|---|---|---|---|---|---|
| H1 | Green Attitude → Green Investment Intention | 0.259 | 6.327 | 0.000 | Accepted |
| H2 | Green Consumption Commitment → Green Investment Intention | 0.221 | 4.712 | 0.000 | Accepted |
| H3 | Green Investment Knowledge → Green Investment Intention | 0.169 | 4.559 | 0.000 | Accepted |
| H4 | Green Perceived Behavioral Control → Green Investment Intention | 0.187 | 5.389 | 0.000 | Accepted |
| H5 | Green Subjective Norms → Green Investment Intention | −0.111 | 2.740 | 0.006 | Not Accepted |
| H6 | Religiosity × Green Subjective Norms → Green Investment Intention | 0.047 | 1.253 | 0.210 | Not Accepted |
| H7 | Religiosity × Green Perceived Behavioral Control → Green Investment Intention | 0.124 | 2.892 | 0.005 | Accepted |
| H8 | Religiosity × Green Attitude → Green Investment Intention | 0.120 | 2.687 | 0.004 | Accepted |
| H9 | Religiosity × Green Consumption Commitment → Green Investment Intention | 0.082 | 2.360 | 0.018 | Accepted |
| H10 | Religiosity × Green Investment Knowledge → Green Investment Intention | 0.057 | 1.676 | 0.094 | Not Accepted |

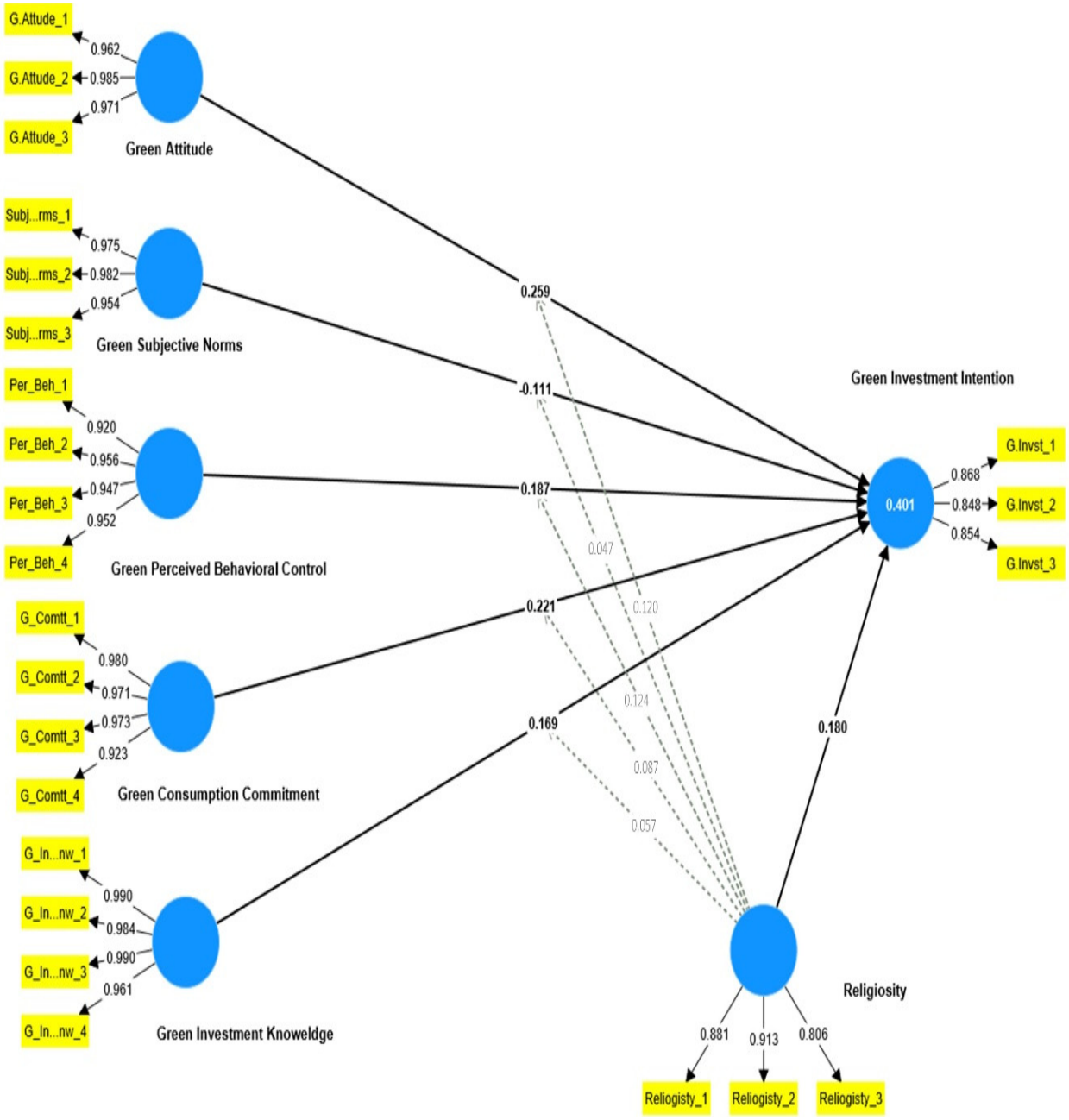


**Figure 2.** The research model.

The study's findings also provide information on how religious beliefs moderate the relationships being examined. The results displayed in Table 5 indicate that there was no significant impact of religiosity on the green subjective norms–GII path (β = 0.47, $t$ = 1.253, $p$ = 0.210), nor on the link between green investment knowledge and GII (β = 0.057, $t$ = 1.676, $p$ = 0.094). Consequently, hypotheses H6 and H10 were not supported. Conversely, religiosity did have a significant moderating effect on the green perceived behaviour control–GII path (β = 0.124, $t$ = 2.892, $p < 0.01$), the green attitude–GII path (β = 120, $t$ = 2.687, $p < 0.01$), and the green consumption commitment–GII path (β = 0.082, $t$ = 2.360, $p < 0.05$). Therefore, Hypotheses H7, H8, and H9 were supported, as seen in Table 5, Figures 2 and 3.

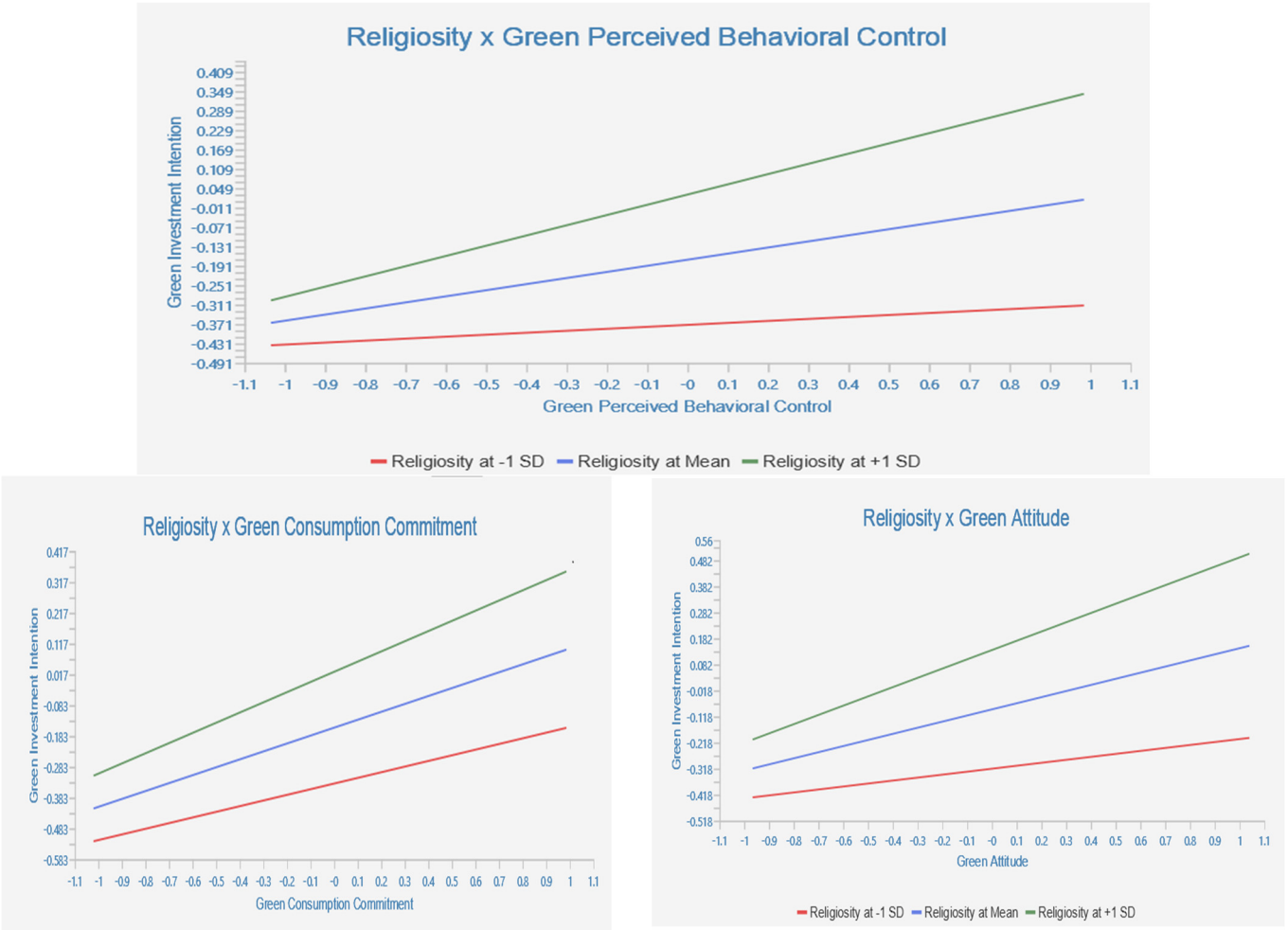


**Figure 3.** Slope Analysis.

## 5. Discussion

Environmental sustainability draws the consideration of policymakers and academics in the context of KSA, especially after instating Vision 2030. This research is among new attempts that investigate the determinants of green investment intention among graduates of agriculture and food science. The study examined an expanded model of TPB that incorporates green ATB, SNs, and PCB with green investment knowledge and green consumption commitment as key determinants of green investment intention. The research examined the moderation role of religiosity in these relationships.

The findings of PLS-SEM supported the TPB framework [20,21] that green ATB and PBC positively and significantly influence green investment intention. These results mean that positive green ATB and green PBC are predictors of green investment intention. These findings are in line with Chan et al. [36], who also found that ATB and PBC are predictors of green investment intention. They also support the work of Osman et al. [17] that ATB and PBC are key determinants of green investment intention. These results confirm that graduates hold positive green ATB. They feel that green investment is a wise idea, green investment performance is generally reliable, and green investment claims are generally trustworthy. The results also mean that graduates perceive themselves as able to participate in green investment. They find it easy to participate in green investment, and they have control in choosing a green investment and want to do this. On the other side, the findings confirmed the negative effect of green SNs on green investment intention. The results confirm that the social influence on green investment is significantly negative. Saudi is categorised as a collective society [73]; hence, its citizens are highly influenced by the

opinion of their family members and friends. The results confirm that social networks and people whose opinions graduates value would not approve of their participation in green investment. These people do not think that graduates should participate in green investment.

The results showed that green consumption commitment among agriculture and food science graduates positively influenced their intention toward green investment. This means that graduates have preferences for green products and services. This positive commitment toward green consumption stimulates graduates to encourage others to establish green products. Such green commitment consumption encourages positive environmental intention and behaviour [21]. Additionally, supporting previous literature reviews [17,43], the current research found that green investment knowledge has a significant positive influence on green investment intention. The results confirm that agriculture and food science graduates have knowledge of green investment, which encourages them to participate in green investment. They believe that green investment is beneficial in the long term.

With regard to the moderation effect of religiosity, the results showed that religiosity has a significant moderating effect on the relationship between green PBC, green ATB, green consumption commitment, and green investment intentions. These results mean that religiosity has the ability to enhance these relationships; hence, it could stimulate green investment intention. On the other hand, religiosity was found to have no significant influence on the relationship between green SNs, green investment knowledge, and green investment intention. In other words, religiosity failed to change the influence of green SNs and green knowledge on green investment intention. Despite this, religiosity still had an impact on green investment intention by moderating the effect of green PBC, green ATB, and green consumption commitment on green investment intentions.

The results have important implications for scholars and policymakers. The results confirmed the direct effect of green ATB, green PBC, green knowledge, and green consumption commitment on green investment intention among agriculture and food science graduates, which has great implications for the growth and sustainability of the Saudi food industry. It is, therefore, important that policymakers pay more attention to these factors to stimulate green investment intention, hence, ensuring sustainable development [18,19]. The results also confirmed the moderating effect of religiosity on the relationship between green ATB, green PBC, green consumption commitment, and green investment intention. It is important that policymakers promote green social influence since this was found to have a significant negative influence on green investment intention. This social influence could be created by university education support given to students and graduates to encourage them to engage in entrepreneurship and investment [23], particularly green investment. University incubation support can also play an important role in stimulating green investment intention [24]. In addition, media activities, including social media, could also be undertaken to highlight the value of green investment for society. The current study highlighted that the role of government is important in stimulating green investment not just through regulation [17] but also through the education system, which has a significant effect on graduates' green ATB, green SNs, green PBC, green knowledge, and green consumption commitment. This green investment intention is the significant predictor of actual green investment, which has implications for sustainable KSA.

## 6. Conclusions

The research investigated a more comprehensive version of TPB, which included green ATB, SNs, and PCB, along with green investment knowledge and green consumption commitment as important factors affecting people's willingness to make green investments. The study also looked at how religiosity affects the relationship between these variables. Data were collected from 550 fresh graduates from agriculture and food science programs in four national universities in KSA (Mohammad ibn Saud Islamic University, King Faisal University, King Khaled University, and Umm Al-Qura University). PLS-SEM was employed as the main data analysis technique to analyse the collected data. The results of the PLS-SEM

analysis indicated that green attitude, green consumption commitment, green investment knowledge, and green perceived behaviour control had a positive and significant impact on GII (Green Investment Intention). However, contrary to the hypothesis, subjective norms had a significant negative effect on GII. Moreover, the findings indicated that the impact of green perceived behaviour control (PBC), green attitude towards behaviour (ATB), and green consumption commitment on green investment intentions is significantly moderated by religiosity. Religiosity can strengthen these connections and consequently promote the intention to invest in green initiatives. However, religiosity was found to have no meaningful impact on the connection between green social norms (SNs), green investment knowledge, and green investment intention. In other words, religiosity did not alter the influence of green social norms and green knowledge on green investment intention.

The current research focused on fresh graduates of agriculture and food science programs using a self-reporting study. Further research could examine the intention of current investors in the Saudi food industry and their intention to turn their current business green. The research has not examined the effect of gender on these links, which could have different results [74]. Hence, further research could examine these results with a wider research sample and examine the role of gender. Other research could examine the influence of personality traits on green investment intention. Additionally, the influence of green legislation on green investment intention and behaviour could be examined.

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