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Enhancing green radical product innovation through sustainable entrepreneurship orientation and sustainable market orientation for sustainable performance: managerial implications from sports goods manufacturing enterprises of China

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ABSTRACT

In the scenario of grappling the ecological threats and challenges, when the organizations have entrepreneurial and market orientations, they will make the organizations innovate their product offering in accordance with sustainability principles, whereas it will also assist them in excelling towards achieving a higher level of sustainable performance. Hence, the current study explores the role of sustainable entrepreneurial and market orientations in improving innovation and sustainability, in the context of Sports manufacturing organizations belonging to China. Through the survey methodology, the current study analyzed the data from 318 professionals from Chinese sports manufacturing companies, upon which 'Partial Least Squares-Structural Equation Modeling' is applied for hypotheses testing. The analysis results in a positive association of 'Sustainable Entrepreneurship Orientation' and 'Sustainable Market Orientation' with 'Green Radical Product Innovation' and all of the three elements of Sustainable Performance. In addition, 'Green Radical Product Innovation' is also reported to increase all three elements of Sustainable Performance. Based on the findings, the sports manufacturing organizations are recommended to re-visit their organizational strategies by incorporating the elements of sustainability in their objectives.

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1. Introduction

Green Innovation, a significant force to counter environmental deterioration, is an approach that can provide assistance to the organization in the reduction of energy consumption while improving productivity levels so that energy is efficiently utilized (Chu et al., 2019). Green innovation is different from other types of innovation

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because of its operationalization, whereby it refers to the process by which contribution is made in designing, transforming, and creating the product, process and procedures so that it has minimal cost to the environment without compromising the financial gains (Castellacci & Lie, 2017; Huang & Chen, 2022). For manufacturing organizations, it is often considered a predicament whether they should have the operations to excel the ecological well-being or they expedite their contribution to the production and gross domestic product, which obviously will affect the natural habitat (Cheng & Liu, 2018). In fact, it is reported that organizations that belong to developing economies rarely follow the principle of ‘treatment after pollution’ and thus keep up the manufacturing while ignoring the threats of environmental pollution, which they are responsible (Xiang et al., 2021). That is why manufacturing organizations are reported to be a major participant in emitting environmental pollution, whereas they must have sheer compliance towards all of the elements of sustainability (Castellacci & Lie, 2017) which include not just ecological but social and economic aspects as well.

Sports goods and related products are a part of every individual’s life, making the manufacturing organization engaged in producing sports-related products extremely important. It is also important to mention that a major chunk of the global production of sports goods is being contributed by developing countries, making this industry more interesting in terms of their behavior towards the environment and ecological sustainability (Huang & Chen, 2022). Moreover, because of the working and operating psychology of organizations from developing countries, the sports industry is also reported to be a contributor to pollution and emission of greenhouse gases. Among the economies contributing to the global production of sports-related products, China is reportedly found to be the largest exporter, whereas this sector has been rapidly expanding over the period of time. This can be understood from the fact that in 2016, China reported having more than 4 million organizations that are engaged in the production and value addition of sports-related products (Huang & Chen, 2022). However, since the majority of organizations are relatively small-scale based compared with the other manufacturing sectors, they are also reported to have comparatively less financial resources and fewer financial gains. Because of these facts, organizations are found to have least reluctant toward green technology (Ahmed et al., 2018). Despite that, an increase has been noticed in the green patents registered by sports manufacturing organizations, which somehow show their receptivity towards green innovation (Huang & Chen, 2022). However, the majority of organizations still look for the driving force which can influence them to have green innovation for the possible improvement in sustainable performance (KarimiTakalo et al., 2021).

According to Chen et al. (2021), sporting events play a direct role in increasing the demand for sports goods; therefore, the production strategies of sports manufacturing organizations are more driven by the international sports events. Even for China, the ‘Beijing Olympic Games’ can be considered the driving force in increasing the number of sports manufacturing organizations operating in China (Huang & Chen, 2022). Unlike other manufacturing sectors, the Chinese sports manufacturing organizations are also reportedly influenced by macro policies which can influence

the organizations to have research and development within their operations, whereby Chinese companies are also powered and supported by huge subsidies, which also provide a room of financial assistance that can be diverted towards green innovation (Huang & Chen, 2022; Hoberg & Phillips, 2016). In addition to this, some other driving forces can transform the organizational psychology toward green innovation, which include the promotion of sports goods, market competition, the industrial policy as well as sporting events, etc. (Hoberg & Phillips, 2016; Aghion et al., 2015; Yi et al., 2019).

In the scenario of grappling the ecological threats and challenges, the industry leaders have identified green opportunities and accordingly predisposed them (Jiang et al., 2018) and initiated the capitalization of the potential benefits through employing green and clean strategies (Demirel et al., 2019). These initiatives taken by the organizations lead towards having the Sustainable Entrepreneurship Orientation (SENTO), which contributes the organizations excelling in their sustainable performance (Soomro et al., 2020). On the other hand, having products that are in accordance with the market trends and demands makes the organization market-oriented, where they have to keep innovating their product offerings as per the recent market trends (Akhtar et al., 2021). Since the sustainability aspects are becoming the market requirements, organizations need to have appropriate market intelligence to comply with the sustainable requirements and their respective integration in their product offerings (Stocker et al., 2021). When the organizations have these two orientations, they will make the organizations excel towards achieving a higher level of sustainable performance (Akhtar et al., 2021; Afum et al., 2021).

The literature exploring the association between sustainable orientations and performance has reported a diversity in terms of the nature of the relationships. For instance, a group of researchers are in agreement that sustainable orientations benefit the organization with financial gains and profits (Jiang et al., 2018; Gupta & Batra, 2016; Shan et al., 2016), whereas another group of researchers negates this idea and reports an ambiguity in validating the positive association between sustainable orientations and performance (Leoncini et al., 2019; Nikolaou et al., 2011). Because of this contrast, there is a strand of researchers who is of the opinion that, despite of having a positive association between sustainable orientations and performance theoretically, the contrast is because of the missing elements between sustainable orientations and performance (Chavez et al., 2020; Al-Dhaafri et al., 2016). Moreover, for sustaining competitive advantage, green innovation, which radically changes the product offerings, is of utmost importance (as already discussed), therefore, the current study is an attempt to use that as the missing element in the relationship between sustainable orientations and performance. Hence, the current study seeks the answer to the following research questions:

RQ1: To what extent does ‘Sustainable Entrepreneurship Orientation’ enhances the ‘Green Radical Product Innovation’ and ‘Sustainable Performance’?

RQ2: To what extent does ‘Sustainable Market Orientation’ enhances the ‘Green Radical Product Innovation’ and ‘Sustainable Performance’?

For seeking the answers to the above-mentioned research questions, the current study is structured as follows: [Section 2](#) covers the discussion regarding the review of

the related literature; [Section 3](#) covers the operationalized methodology; [Section 4](#) covers the statistical analysis and results; and [Section 5](#) covers the Conclusion and Recommendations.

2. Literature review

2.1. Sustainable entrepreneurship orientation, green radical product innovation, and sustainable performance

Sustainable Entrepreneurship Orientation (SENTO) is an orientation of an organization that is strategic in nature and entails two distinct aspects, namely sustainability and entrepreneurship (Criado-Gomis et al., 2018; Criado-Gomis et al., 2020). The Entrepreneurship Orientation covers the aspects of entrepreneurial actions when organizations are engaged in the process of decision making, whereas an organization is said to have a sustainable orientation when they integrate the aspects of sustainability within their operations (Criado-Gomis et al., 2017). As a whole, SENTO refers to the strategic orientation which involves the activities of identifying and extracting opportunities that assist the organization in creating future products, services, processes, and procedures, so that the people, society, and economy are accordingly served (Shepherd & Patzelt, 2011). In addition to this, there are three important considerations that SENTO comprises: the capability to take risks, the ability to react proactively, and, most important capability to have innovativeness (Syrjä et al., 2019). Through SENTO, an organization is in the right direction towards sustainability by excelling the Green Radical Product Innovation (GRPIN) (Afum et al., 2021).

In fact, according to Sarsah et al. (2020) and Pratono et al. (2019), innovation is an important outcome that results from SENTO. Besides, the other dimensions of SENTO, which are risk-taking and proactive-ness, also contribute to GRPIN (Afum et al., 2021). For instance, when an organization is capable and resilient to take risks in the presence of evolving market conditions, it can simply innovate its existing product offerings to align with the current need of the markets (Lin et al., 2009). Similarly, by being proactive, firms can incorporate innovation in their product offerings (Sarsah et al., 2020; Shih, 2018). On the other hand, through SENTO, organizations can contribute to excelling towards sustainability in multiple ways. This is because when an organization is about to exploit the market opportunities, it can accordingly do so while improving its sustainable performance simultaneously (Afum et al., 2021). For instance, by decreasing the adverse effects of pollution and carbon emissions in designing the product and their processes, companies are contributing in excelling their environmental performance (ENPR) (Orazalin & Baydauletov, 2020; Xie et al., 2016). On the other hand, through SENTO, organizations are also reported to enhance their social performance (SCPR) by contributing to society, and improving their social reputation (Criado-Gomis et al., 2020; Goldsby et al., 2018). Nevertheless, through all of the green initiatives, after ascertaining the risks and responding to the market change, the organization's economic performance (ECOP) will also be increased (Afum et al., 2021). Hence it is proposed that:

H1: SENTO can significantly enhance the GRPIN.

H2: SENTO can significantly enhance the ENPR.

H3: SENTO can significantly enhance the ECOP.

H4: SENTO can significantly enhance the SCPR.

2.2. Sustainable market orientation, green radical product innovation, and sustainable performance

Market orientation is a phenomenon where an organization is said to be market-oriented when they offer their products in accordance with the preferences of the buyers while incorporating all of the necessary communication, information, and feedback from the buyers' end, to enhance the quality of their product offerings through innovation and commitment (Tajeddini et al., 2006). In addition, it is reported that organizations focused on green innovation-oriented market orientation can enhance their consumer value when they align their culture and management philosophy (Green et al., 2015). This is because through market orientation, firms are in a better position to attain the relevant market information, which assists them in understanding the change in the market trend and behavior (Nasution et al., 2011). In addition to this, sometimes, it is because of the market pressures that influence the organization to integration of sustainability principle as a part of their market completion, which organizations have to follow in order to remain competitive in the market (Hart & Dowell, 2011; Atuahene-Gima, & 2001). Hence a firm is said to be market-oriented when they keep on innovating their product offerings as per the recent market trends (Akhtar et al., 2021). On the other hand, as the phenomena of market orientation is comprised of generating, disseminating, and responding to market intelligence, market intelligence assists firms in excelling in their sustainable performance (Stocker et al., 2021). Hence it is proposed that:

H5: SMKTO can significantly enhance the GRPIN.

H5: SMKTO can significantly enhance the ENPR.

H7: SMKTO can significantly enhance the ECOP.

H8: SMKTO can significantly enhance the SCPR.

2.3. Green radical product innovation and sustainable performance

The connection between GRPIN and all three dimensions of sustainable performance has attracted numerous researchers' attention these days. As already discussed, innovation is an essential element whenever organizations want to improve their ecological and social performance (Adams et al., 2016), which assists the organizations in improving their contributions to society's health and safety. Moreover, compliance with the well-being of the environment and its respective integration in the product offerings leads organizations to increase their financial gains, market reputation, and social value while comparing them with those who fail to do that (Zhu & Sarkis, 2007). Therefore, organizations that integrate green product offerings are more likely to gain extended financial gains, thus leading them to improve their financial

performance (Singh et al., 2020), their contribution to society (Zhang et al., 2020), ecological performance (El-Kassar & Singh, 2019), business performance (Pérez-Luño et al., 2019), thus the overall sustainable performance (Afum et al., 2021). Hence it is proposed that:

H9: GRPIN can significantly enhance the ENPR.

H10: GRPIN can significantly enhance the ECOP.

H11: GRPIN can significantly enhance the SCPR.

2.4. The framework of the study

Based on the hypotheses' proposition, the study's framework is shown in Figure 1.

3. Methodology

In the current research, the approach that is used for answering the proposed research questions is the quantitative research approach. In this approach, there is an involvement of quantitative data on which an application of statistical or mathematical analysis is performed for the generation of the outcome. The quantitative approach is considered to be more appropriate where findings are assessed in the pursuit of testing the proposed hypotheses (Cooper et al., 2006). Within the quantitative approach, the number of research designs can be selected depending upon the nature and objectives of the research. In the current study, the Survey research design was selected. In this kind of research, the data is collected through a structured questionnaire which normally is developed having the standard of being self-administered, and then there is an application of statistical analysis on it. Similar to any other research methodology, the survey methodology should also be implemented with due prudence; hence the suggestions discussed by Hulland et al. (2018) were carefully considered during the operationalization of the research. In addition, the research is also prone to methodological variance, referred to as 'Common Method Variance' (CMV), which tends to inflate the outcome (Podsakoff et al., 2003). Therefore, the methodological remedies proposed by Podsakoff et al. (2012) were followed so that the data is collected and analyzed after eliminating the possibility of absorption of unwanted variation.

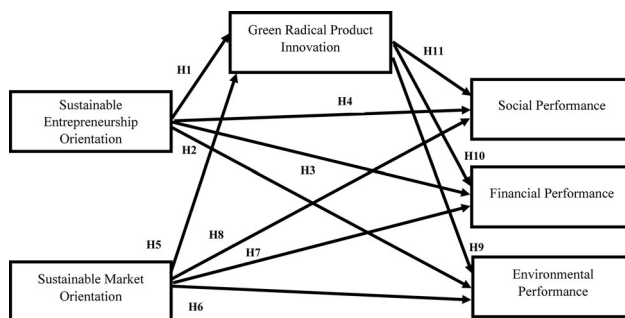


Figure 1. Framework of the study.

Source: Authors Construction.

Table 1. Source of measures.

Constructs	Number of items	Sources
Sustainable Entrepreneurship Orientation	4	Criado-Gomis et al. (2020); Jiang et al. (2018)
Sustainable Market Orientation	4	Kvitastein et al. (2019)
Green Radical Product Innovation	4	Guo et al. (2020); Shu et al. (2016)
Environmental Performance	6	Iranmanesh et al. (2019)
Social Performance	5	Iranmanesh et al. (2019)
Economic Performance	6	Iranmanesh et al. (2019)

Moreover, in the survey methodology, the most important element is the survey questionnaire, which is the tool through which the data is collected. As already discussed that the questionnaire is developed so that it remains self-administered, for efficient navigation, it is divided into two parts. The first part comprised questions that were asked to gauge the respondents' responses against the studied variables. The second part comprised of questions related to the demographic profiles of the respondents. For the first part, the respondents must get the same understanding of a question that the researcher intends to ask. Therefore, the current study relied on the already developed and tested scales in earlier studies. Therefore, the sources from where the scales were adapted are mentioned in Table 1.

For collecting the responses against the adapted scales which are mentioned in Table 1, the respondents were asked to reflect their tendency of agreement against the 5-point Likert Scale, where '1 represents Strongly Disagree', '2 represents Disagree', '3 represents neither Disagree nor Agree', '4 represents Agree', and '5 represents Strongly Agree'. In addition to this, since the current study is focused on the companies that are engaged in the manufacturing of sports goods, only those companies were selected for data collection that are listed in 'Shenzhen Stock Exchange' and 'Shanghai Stock Exchange'. In addition, while shortlisting the companies, it is ensured that they have categorically mentioned sports products in their 'Management Discussion and Analysis (MD&A)' section in the annual reports. Once the companies' lists were shortlisted, they were approached through the developed questionnaires via email. In addition of being sports manufacturing companies, only working professionals from those departments or functions were approached that are directly linked with the production and development activity of the sports goods. This is because only the production-related people are aware of the possible innovation and sustainability practices that are being taken primarily during the manufacturing of the sports goods.

The dataset of the current study is comprised of the responses of 318 professionals. Among these 318 professionals, in terms of gender, 47% of respondents have reported them as females, which is 151, whereas 53% of respondents have reported them as males, which is 167. Age-wise, 29% of respondents have reported their age below 30 which makes them 91, 43% of respondents have reported their age between 31–40 years which makes them 137, and 19% of respondents have reported their age between 41–50 years which makes them 59, and 10% of respondents have reported their age more than 51 years which makes them 31. Experience-wise, 26% of respondents have reported themselves as having experience of less than 3 years which makes them 84, 36% of respondents have reported themselves as having experience between

Table 2. Descriptive statistics.

	Frequency	Percent
Gender		
Female	151	47%
Male	167	53%
Total	318	100%
Age		
30 or less years	91	29%
31–40 years	137	43%
41–50 years	59	19%
51 and above	31	10%
Total	318	100%
Experience		
Less than 3 years	84	26%
3–5 years	113	36%
6–10 years	75	24%
More than 10 years	46	14%
Total	318	100%
Department		
Procurement	85	27%
Material Planning	66	21%
Production	89	28%
Research and Development	64	20%
Logistics	14	4%
Total	318	100%

Source: Authors Estimation.

3 to 5 years which makes them 113, 24% of respondents have reported themselves as having experience between 6 to 10 years which makes them 75, 14% of respondents have reported themselves as having experience more than 10 years which makes them 46. In terms of their relatedness from the department or the functional areas, 27% of respondents have reported themselves being engaged in the procurement related activities which makes them 85, 21% of respondents have reported themselves being engaged in material planning-related activities, which makes them 66, 28% of respondents have reported themselves being engaged in the production related activities which makes them 89, 20% of respondents have reported themselves being engaged in the research and development related activities which makes them 64, and 4% of respondents have reported themselves being engaged in the logistics related activities which makes them 14. The demographic summary of the collected respondents is mentioned in [Table 2](#).

4. Estimations and results

For empirically investigating the proposed hypotheses, the data was collected, which were statistically analyzed using ‘Partial Least Squares-Structural Equation Modeling’ (PLS-SEM). The application of PLS-SEM is made because of its tendency to explain more variation from the data, especially when the models are relatively complex, whereas it remains robust in generating outcomes even when the data lacks normality (Hair et al., 2019). Therefore, the application of PLS-SEM is made utilizing the software named SMARTPLS. In addition, during the application, the legitimacy of the PLS-SEM application is assessed by following the guidelines by Hair, Hult, Ringle,

and Sarstedt, (2016). The Hair, Hult, Ringle, and Sarstedt, (2016) have suggested the application assessment in two stages which are discussed in subsequent sections.

4.1. Assessment of the outer model

According to Hair, Hult, Ringle, and Sarstedt, (2016), in this step, the assessment of the relationships of the measurement scales are assessed with the respective constructs. These assessments are done by ensuring the meeting of convergent validity and discriminant validity. Convergent validity assesses the tendency of relatedness of the measuring items with their respective constructs (Mehmood & Najmi, 2017). For this, the parameters of Factor Loadings, Cronbach's Alpha, Composite Reliability, and 'Average Variance Extracted' (AVE) have been utilized. For Factor Loadings, the threshold stated by Hair, Hult, Ringle, and Sarstedt, (2016) stated that it must be greater than 0.7, which is found in the current study (refer to 3rd Column of Table 3). For Cronbach's Alpha, the threshold stated by Hair, Hult, Ringle, and Sarstedt, (2016) stated it must be greater than 0.7, which is also found in the current study (refer to 4th Column of Table 3). For Composite Reliability, the threshold stated by Hair, Hult, Ringle, and Sarstedt, (2016) stated that it must be greater than 0.7, which is also found in the current study (refer to 5th Column of Table 3). For AVE, the threshold stated by Hair, Hult, Ringle, and Sarstedt, (2016) stated that it must be greater than 0.5, which is also found in the current study (refer to 6th Column of Table 3).

Table 3. Measurement model results.

Variables	Items	Factor loadings	Cronbach's alpha	Composite reliability	AVE
Sustainable Entrepreneurship Orientation	SENTO1	0.776	0.718	0.828	0.656
	SENTO2	0.772			
	SENTO3	0.774			
	SENTO4	0.827			
Sustainable Market Orientation	SMKTO1	0.788	0.742	0.815	0.557
	SMKTO2	0.802			
	SMKTO3	0.813			
	SMKTO4	0.832			
Green Radical Product Innovation	GRPIN1	0.774	0.786	0.792	0.590
	GRPIN2	0.780			
	GRPIN3	0.833			
	GRPIN4	0.757			
Environmental Performance	ENPR1	0.779	0.724	0.787	0.570
	ENPR2	0.787			
	ENPR3	0.806			
	ENPR4	0.827			
	ENPR5	0.817			
	ENPR6	0.756			
Social Performance	SCPR1	0.825	0.720	0.827	0.680
	SCPR2	0.759			
	SCPR3	0.787			
	SCPR4	0.814			
	SCPR5	0.794			
Economic Performance	ECOP1	0.785	0.739	0.789	0.547
	ECOP2	0.784			
	ECOP3	0.771			
	ECOP4	0.758			
	ECOP5	0.824			
	ECOP6	0.809			

Source: Authors Estimation.

Discriminant validity assesses the tendency of divergence of the measuring items of the constructs with the measuring items of the other constructs (Mehmood & Najmi, 2017). This assessment is made through three parameters. The first parameter is the values of Cross Loadings. During this assessment, the values of the loadings of the measuring items of a construct are evaluated against the other constructs. Moreover, the difference between the loadings and the cross-loadings need to be evaluated, which exceeds the difference of 0.1 (Gefen & Straub, 2005). The assessment of the cross-loadings as per the threshold suggested by Gefen and Straub (2005) is listed in Table 4.

Another criterion for assessing the discriminant validity is the Fornell-Larcker (1981). As per this, a comparison is assessed among the square root of AVE of the constructs with the values of the correlations across the constructs. Ideally the square root should be higher against all of the possible combinations of the correlations, whereas the failure leads to the do is an indication of the violation of discriminant validity. The assessment is listed in Table 5.

In addition to this, the third criteria that is used for assessing the discriminant validity is the newly proposed criteria by Henseler et al. (2015), which is named as ‘Heterotrait-Monotrait ratio of correlations’ (HTMT). As per this, the requirement of discriminant validity is only considered to be met when the values are found to be less than 0.85. The assessment of HTMT is listed in Table 6.

Table 4. Results of loadings and cross loadings.

Variable	SENTO	SMKTO	GRPIN	ENPR	SCPR	ECOP
Sustainable Entrepreneurship Orientation	0.776	0.355	0.374	0.372	0.396	0.385
	0.772	0.337	0.372	0.296	0.347	0.387
	0.774	0.382	0.321	0.360	0.298	0.292
	0.827	0.362	0.355	0.385	0.391	0.344
Sustainable Market Orientation	0.306	0.788	0.352	0.295	0.324	0.378
	0.321	0.802	0.362	0.353	0.290	0.304
	0.337	0.813	0.312	0.306	0.343	0.332
	0.301	0.832	0.373	0.343	0.316	0.336
Green Radical Product Innovation	0.395	0.357	0.774	0.364	0.364	0.300
	0.339	0.331	0.780	0.391	0.300	0.319
	0.382	0.354	0.833	0.329	0.386	0.323
	0.334	0.301	0.757	0.337	0.295	0.392
Environmental Performance	0.376	0.296	0.384	0.779	0.337	0.298
	0.393	0.352	0.356	0.787	0.314	0.384
	0.318	0.346	0.369	0.806	0.314	0.311
	0.376	0.298	0.292	0.827	0.379	0.331
	0.315	0.368	0.338	0.817	0.333	0.359
Social Performance	0.293	0.295	0.392	0.756	0.389	0.354
	0.353	0.325	0.330	0.397	0.825	0.379
	0.358	0.367	0.377	0.343	0.759	0.307
	0.347	0.326	0.303	0.377	0.787	0.359
	0.295	0.388	0.346	0.322	0.814	0.386
Economic Performance	0.325	0.295	0.382	0.388	0.794	0.293
	0.398	0.349	0.328	0.314	0.375	0.785
	0.400	0.321	0.318	0.370	0.297	0.784
	0.312	0.335	0.357	0.398	0.350	0.771
	0.299	0.384	0.364	0.373	0.312	0.758
	0.347	0.370	0.307	0.394	0.348	0.824
	0.360	0.353	0.361	0.353	0.381	0.809

Source: Authors Estimation.

Table 5. Discriminant validity Fornell-Larcker criterion.

CONSTRUCTS	SENTO	SMKTO	GRPIN	ENPR	SCPR	ECOP
SENTO	0.827					
SMKTO	0.472	0.752				
GRPIN	0.425	0.550	0.836			
ENPR	0.488	0.585	0.502	0.811		
SCPR	0.513	0.482	0.567	0.311	0.826	
ECOP	0.378	0.554	0.468	0.513	0.503	0.806

Source: Authors Estimation.

Table 6. Results of HTMT ratio of correlations.

CONSTRUCTS	SENTO	SMKTO	GRPIN	ENPR	SCPR	ECOP
SENTO						
SMKTO	0.643					
GRPIN	0.599	0.437				
ENPR	0.442	0.507	0.604			
SCPR	0.757	0.491	0.680	0.570		
ECOP	0.573	0.702	0.454	0.694	0.424	

Source: Authors Estimation.

Table 7. Predictive power of construct.

	R-Square	Q-Square
GRPIN	0.165	0.116
ENPR	0.227	0.122
ECOP	0.240	0.103
SCPR	0.206	0.097

Source: Authors Estimation.

4.2. Assessment of the inner model

According to Hair, Hult, Ringle, and Sarstedt, (2016), in this step, the assessment of relationships of the constructs within the overall model are assessed through the ‘coefficient of determination’, which is represented by R-Square and ‘Cross-Validated Redundancy’, which is represented by Q-Square. There are different cut-off values for R-Square, however, the more frequently used is the proposition of Cohen (1988). According to Cohen (1988), a value of R-Square will be considered as substantial if it is greater than 0.26, whereas it will be considered as weak if it is less than 0.02. The values that lie between 0.26 and 0.02 will be considered as moderate. On the other hand, for Q-Square, Hair, Hult, Ringle, and Sarstedt (2016) stated that any value that is greater than 0 is acceptable. The assessment of the inner model is listed in Table 7.

4.3. Hypotheses testing

Another advantage of applying PLS-SEM is the generation of the significance of the statistical tests by following the bootstrapping methodology in which numerous sub-samples from the data are drawn, and the significance value is computed accordingly. Hair, Hult, Ringle, and Sarstedt, (2016) recommended the generation of 5000 sub-samples while assessing the significance of the proposed hypotheses, which is accordingly conducted in the present study.

Firstly, the level of association of Sustainable Entrepreneurship Orientation (SENTO) with the other criterion variables is assessed. For its effect on Green Radical Product Innovation (GRPIN), the application of PLS-SEM reported a positive impact which is also statistically significant at 1% significance level ($\beta = 0.223$, $p < 0.01$). The basic interpretation of this result could be, an increase in SENTO will lead to an improvement of 22.3% in GRPIN. It is a reflection that when an organization follows the sustainable principles while having an entrepreneurial orientation, in which the enterprises think of technological advancement prior to competitors, remain proactive in bringing sustainable change in the product offerings, and always strive for having a lead in the market through sophisticated and sound entrepreneurial aptitude, then they are more likely to innovate radically in their product offerings. For the effect of SENTO on Environmental Performance (ENPR), the application of PLS-SEM reported a positive impact which is also statistically significant at 1% significance level ($\beta = 0.189$, $p < 0.01$). The basic interpretation of this result could be, an increase in SENTO will lead to an improvement of 18.9% in ENPR. It is a reflection that when an organization follows the sustainable principles while having an entrepreneurial orientation, in which the enterprises think of technological advancement prior to competitors, remain proactive in bringing sustainable change in the product offerings, and always strive for having a lead in the market through sophisticated and sound entrepreneurial aptitude, then they are more likely to take initiatives regarding ecological and environmental preservation and conservation while optimizing the energy consumption, reducing the carbon emissions and level of other greenhouse gas emissions. For the effect of SENTO on Economic Performance (ECOP), the application of PLS-SEM reported a positive impact which is also statistically significant at 1% significance level ($\beta = 0.117$, $p < 0.01$). The basic interpretation of this result could be, an increase in SENTO will lead to an improvement of 11.7% in ECOP. It is a reflection that when an organization follows the sustainable principles while having an entrepreneurial orientation, in which the enterprises think of technological advancement prior to competitors, remain proactive in bringing sustainable change in the product offerings, and always strive for having a lead in the market through sophisticated and sound entrepreneurial aptitude, then they are more likely to take financial gains through it by improving their financial performance which will eventually improve their financial position. For the effect of SENTO on Social Performance (SCPR), the application of PLS-SEM reported a positive impact which is also statistically significant at 1% significance level ($\beta = 0.154$, $p < 0.01$). The basic interpretation of this result could be, an increase in SENTO will lead to an improvement of 15.4% in SCPR. It is a reflection that when an organization follows the sustainable principles while having an entrepreneurial orientation, in which the enterprises think of technological advancement prior to competitors, remain proactive in bringing sustainable change in the product offerings, and always strive for having a lead in the market through sophisticated and sound entrepreneurial aptitude, then they are more likely to take initiatives regarding social welfare, stakeholders well-being, employee empowerment and fulfilling their corporate social responsibility.

Secondly, the level of association of Sustainable Market Orientation (SMKTO) with the other criterion variables is assessed. For its effect on Green Radical Product

Innovation (GRPIN), the application of PLS-SEM reported a positive impact which is also statistically significant at 1% significance level ($\beta = 0.154$, $p < 0.01$). The basic interpretation of this result could be, an increase in SMKTO will lead to an improvement of 15.4% in GRPIN. It is a reflection that when an organization follows the sustainable principles while having a market orientation, in which the enterprises think of their customers, their regular changing needs and wants and tries to meet that change in customer demand prior to their competitors, and always strive for having a lead in the market through sophisticated and sound market aptitude, then they are more likely to innovate radically in their product offerings. For the effect of SMKTO on Environmental Performance (ENPR), the application of PLS-SEM reported a positive impact which is also statistically significant at 1% significance level ($\beta = 0.250$, $p < 0.01$). The basic interpretation of this result could be, an increase in SMKTO will lead to an improvement of 25% in ENPR. It is a reflection that when an organization follows the sustainable principles while having a market orientation, in which the enterprises think of their customers, their regular changing needs and wants and tries to meet that change in customer demand prior to their competitors, and always strive for having a lead in the market through sophisticated and sound market aptitude, then they are more likely to take initiatives regarding ecological and environmental preservation and conservation while optimizing the energy consumption, reducing the carbon emissions and level of other greenhouse gas emissions. For the effect of SMKTO on Economic Performance (ECOP), the application of PLS-SEM reported a positive impact which is also statistically significant at 1% significance level ($\beta = 0.260$, $p < 0.01$). The basic interpretation of this result could be, an increase in SMKTO will lead to an improvement of 26% in ECOP. It is a reflection that when an organization follows the sustainable principles while having a market orientation, in which the enterprises think of their customers, their regular changing needs and wants and tries to meet that change in customer demand prior to their competitors, and always strive for having a lead in the market through sophisticated and sound market aptitude, then they are more likely to take financial gains through it by improving their financial performance which will eventually improve their financial position. For the effect of SMKTO on Social Performance (SCPR), the application of PLS-SEM reported a positive impact which is also statistically significant at 1% significance level ($\beta = 0.198$, $p < 0.01$). The basic interpretation of this result could be, an increase in SMKTO will lead to an improvement of 19.8% in SCPR. It is a reflection that when an organization follows the sustainable principles while having a market orientation, in which the enterprises think of their customers, their regular changing needs and wants and tries to meet that change in customer demand prior to their competitors, and always strive for having a lead in the market through sophisticated and sound market aptitude, then they are more likely to take initiatives regarding social welfare, stakeholders well-being, employee empowerment and fulfilling their corporate social responsibility. (Table 8)

Thirdly, the level of association of Green Radical Product Innovation (GRPIN) with the other criterion variables is assessed. For the effect of GRPIN on Environmental Performance (ENPR), the application of PLS-SEM reported a positive impact which is also statistically significant at 1% significance level ($\beta = 0.147$, $p < 0.01$). The basic

Table 8. Results of path coefficients (direct effects).

Hypothesized path	Path coefficient	C.R	<i>p</i> -value	Remarks
SENTO → GRPIN	0.223	6.712	0.000	Supported
SENTO → ENPR	0.189	10.502	0.000	Supported
SENTO → ECOP	0.117	7.293	0.000	Supported
SENTO → SCPR	0.154	13.231	0.000	Supported
SMKTO → GRPIN	0.154	8.096	0.000	Supported
SMKTO → ENPR	0.250	9.272	0.000	Supported
SMKTO → ECOP	0.260	12.331	0.000	Supported
SMKTO → SCPR	0.198	8.739	0.000	Supported
GRPIN → ENPR	0.147	7.584	0.000	Supported
GRPIN → SCPR	0.310	9.810	0.000	Supported
GRPIN → ECOP	0.276	11.956	0.000	Supported

Note: Level of Significance (5% i.e., 0.050).

Source: Authors' Estimation.

interpretation of this result could be, an increase in GRPIN will lead to an improvement of 14.7% in ENPR. It is a reflection that when an organization strives for radical innovation in their product offerings through continuous innovativeness and improvement, research and development for introducing product offerings that are green and clean, then they are more likely to take initiatives regarding ecological and environmental preservation and conservation while optimizing the energy consumption, reducing the carbon emissions and level of other greenhouse gas emissions. For the effect of GRPIN on Economic Performance (ECOP), the application of PLS-SEM reported a positive impact which is also statistically significant at 1% significance level ($\beta = 0.276$, $p < 0.01$). The basic interpretation of this result could be, an increase in GRPIN will lead to an improvement of 27.6% in ECOP. It is a reflection that when an organization strives for radical innovation in their product offerings through continuous innovativeness and improvement, research and development for introducing product offerings that are green and clean, then they are more likely to take financial gains through it by improving their financial performance which will eventually improve their financial position. For the effect of GRPIN on Social Performance (SCPR), the application of PLS-SEM reported a positive impact which is also statistically significant at 1% significance level ($\beta = 0.310$, $p < 0.01$). The basic interpretation of this result could be, an increase in GRPIN will lead to an improvement of 31% in SCPR. It is a reflection that when an organization strives for radical innovation in their product offerings through continuous innovativeness and improvement, research and development for introducing product offerings that are green and clean, then they are more likely to take initiatives regarding social welfare, stakeholders' well-being, employee empowerment and fulfilling their due corporate social responsibility.

The hypotheses testing by applying PLS-SEM and the respective generated outcome are graphically represented in [Figure 2](#).

5. Conclusion and recommendations

In the scenario of grappling the ecological threats and challenges, the industry leaders have started identifying green opportunities and accordingly predisposition them and initiated capitalizing the potential benefits through employing the green and clean strategies. For that, there is a need to have entrepreneurial actions where

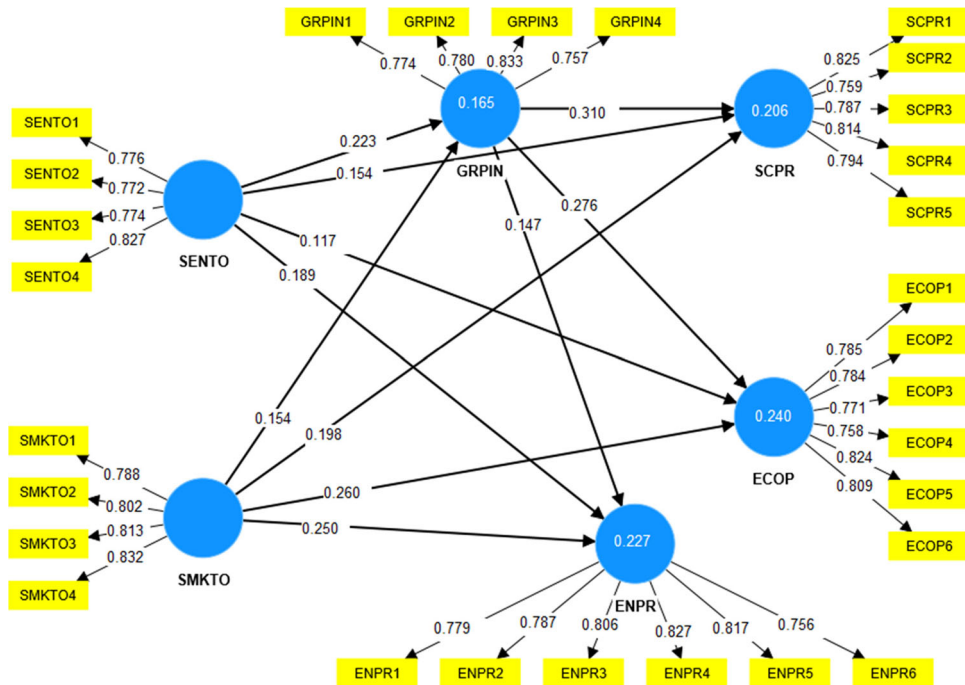


Figure 2. PLS output (hypotheses testing).
Source: Authors Construction.

organizations are engaged in the process of decision-making with a sustainable orientation where they can integrate the aspects of sustainability within their operations. Moreover, when organizations have products that are in accordance with the market trends and demands, then the organization is said to be market-oriented and has to keep innovating its product offerings as per the recent market trends. Furthermore, when the organizations have entrepreneurial and market orientations, they will make the organizations to innovate their product offering in accordance with sustainability principles, whereas it will also assist them in excelling towards achieving a higher level of sustainable performance.

Therefore, the current study is conducted to explore the context of Sports manufacturing organizations belonging to China, as it is reportedly found to be the largest exporter, whereas this sector has been rapidly expanding over a period of time. Through the survey methodology, the current study analyzed the data from 318 professionals from Chinese sports manufacturing companies, upon which 'Partial Least Squares-Structural Equation Modeling' is applied for hypotheses testing. The analysis results in a positive association of 'Sustainable Entrepreneurship Orientation' and 'Sustainable Market Orientation' with 'Green Radical Product Innovation' and all of the three elements of Sustainable Performance. In addition, 'Green Radical Product Innovation' is also reported to increase all three elements of Sustainable Performance. These findings are quite interesting in the context of Sports manufacturing enterprises in China.

Based on the findings, the sports manufacturing organizations are recommended to re-visit their organizational strategies by incorporating the elements of sustainability in

their objectives. Moreover, organizations also need to accommodate more financial investments for environmental and social-related initiatives, increasing their market reputation in the short run and the financial gains in the longer period. Additionally, the Chinese government and its respective law-making organizations are advised to draft the macro policies that provide financial assistance to this sector, as this sector heavily relies on financial subsidies. Through such assistance, organizations will identify the room for green innovations, which will benefit the organizations and the Chinese economy. Moreover, the general awareness regarding sustainability at manufacturing can also make a difference in the organization toward sustainable philosophy. Lastly, organizations are recommended to give more attention to consumer demand and requirements as they are rapidly changing, urging manufacturers to comply more with the environment and society.

In accordance with the limitations, the current study has various propositions for future research. Firstly, the contribution of sports manufacturing organizations in global sports cannot be ignored; therefore, there is a need to have exploration of other sports exporting economies like Pakistan, Korea, Japan, and so on. Secondly, there is a need to explore other manufacturing sectors in terms of their orientations towards sustainability. Thirdly, based on the unexplained variance, some other predictors can further explain the 'Green Radical Product Innovation' and the Sustainable Performance; hence they need to be explored. Lastly, there is a need to have studies that can explore macroeconomic policies' role in improving innovation and sustainable performance.

Disclosure statement

No potential conflict of interest was reported by the authors.

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