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## Green Entrepreneurial Orientation and Green Incremental Innovation: The Mediating Role of Supply Chain Learning

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### ABSTRACT

The concept of green entrepreneurial orientation combines aspects of entrepreneurship and environmental sustainability, supporting supply chain learning and enhancing the flow of information related to green incremental innovation. The research aims to analyze the effect of green entrepreneurial orientation on green incremental innovation with mediation of supply chain learning. The sample of this study consists of 85 hotel employees in Yogyakarta, Indonesia. Data processing was conducted using Structural Equation Model-Partial Least Square version 4.0. This study shows that green entrepreneurial orientation has a positive effect on green incremental innovation, green entrepreneurial orientation positively influences supply chain learning, supply chain learning positively impacts green incremental innovation, and green entrepreneurial orientation positively affects green incremental innovation with supply chain learning as a mediator.



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## 1. INTRODUCTION

Environmental damage has increased significantly in recent years (Hugo & Nuringsih., 2020). Environmental problems have a serious impact on economic growth and ecosystems (Leonidou et al., 2017). As environmental issues gain prominence, the business sector is increasingly adopting sustainability principles by producing environmentally friendly products (Das & Rangarajan, 2020). Sustainability principles do not focus solely on profit but also consider how a company's performance impacts the environment and society. In this context, the concept of sustainability refers to a company's responsibility to its surrounding environment, which is influenced by government policies, climate change, social shifts, and changes in information technology (Daft & Samson, 2015). Green entrepreneurial orientation is one of the important factors in reducing the negative impact of company

operations on the environment (Jiang et al., 2018). Green entrepreneurial orientation is defined as the tendency to obtain ecological and economic benefits by conducting environmentally friendly activities (Jiang et al., 2018). In addition, green entrepreneurial orientation also refers to a company's tendency to generate economic profits while providing positive impacts on the environment through the offering of environmentally friendly products.

Green entrepreneurial orientation drives progress through sustainable innovation to capitalize on opportunities and proactive environmentally friendly attitudes (Pratono et al., 2019). Green entrepreneurial orientation reflects a company's desire to conduct business processes with consideration for the environment and to provide benefits to the surrounding community. Companies take various steps to adapt so they can find and develop processes, products, and/or services that are more environmentally friendly. This certainly involves existing internal and external resources (Jiang et al., 2018). Companies that apply the principles of green entrepreneurial orientation strive to optimize resource use and reduce their negative impact on the environment. This enables companies to discover and develop green incremental innovation concepts in a more efficient and organized manner. Companies focused on green entrepreneurial orientation are considered capable of increasing their level of activity and boldness in adopting environmentally friendly technologies, thereby enabling them to achieve a higher level of green incremental innovation. Thus, green entrepreneurial orientation can be regarded as one of the determining factors in the creation of green incremental innovation. Green incremental innovation is an innovative concept of products, processes, or services that aim to protect the environment and are created by companies through the development or introduction of incremental environmental technologies (Chen et al., 2014). Additionally, green incremental innovation can also be defined as a term referring to efforts to develop new production and technologies aimed at reducing negative impacts on the environment, such as pollution and exploitation of natural resources (Castellacci & Lie, 2017).

Entrepreneurially oriented companies tend to create opportunities to learn new things and encourage employees to continue learning and developing themselves in entrepreneurship. In addition, an entrepreneurial approach also provides management lessons in developing knowledge about the supply chain (Shan et al., 2016). Therefore, the introduction of the concept of green entrepreneurial orientation, which combines entrepreneurial aspects and environmental sustainability, can reduce the mental stress felt by members of the supply chain and improve the flow of information and knowledge between organizations. As a result, this can have a positive impact on the supply chain learning process (Guo et al., 2018). Supply chain learning can be defined as the steps taken by a company to obtain, absorb, and utilize knowledge, including from its main suppliers and customers (Huo et al., 2021). The supply chain is still considered a key factor that can provide competitive advantage. One of the main objectives of the supply chain is to develop new capabilities for the companies involved to create a competitive advantage over their competitors.

Increasing pollution and the growing scarcity of natural resources have made environmental protection an increasingly important concern in many countries, particularly developing nations. Developing countries face imbalances in terms of economic development, gross domestic product growth, and environmental protection. As a result, this leads to excessive resource use and rising levels of environmental pollution (Pan et al., 2014). Every company needs a strategy to address environmental issues, win the market with environmentally friendly products, and remain operational in the future. Therefore, green innovation strategy is considered the most important strategy in today's era of environmental awareness. Previous researchers have focused on how companies formulate and implement environmental strategies, innovate, and produce environmentally friendly products with the aim of achieving better performance and enhancing competitive advantage. Green innovation supports

environmental sustainability by helping companies create environmentally friendly products, thereby realizing the goals of sustainable development (Xie et al., 2019).

The dynamic capabilities theory proposed by Teece et al. (1997) emphasizes a company's ability to respond to environmental changes by integrating, building, and reconfiguring internal and external resources. In the context of green entrepreneurial orientation and supply chain learning, this theory can be interpreted as a company's ability to develop green incremental innovation through learning and adaptation within the company's supply chain. Although previous research supports the influence of green entrepreneurial orientation, green incremental innovation, and supply chain learning, previous studies have been inconsistent, thus this research tests the consistency of prior studies.

One industry that relies heavily on natural resources for its business processes and generates waste and pollutants is the hospitality industry (Nilashi et al., 2019). The hospitality industry plays a role in promoting environmentally friendly consumption. Therefore, it can be said that sustainability performance is very important for improving the environment and maintaining competitive advantage. According to Martínez-Perez et al. (2015), environmentally friendly initiatives have become popular in the hospitality industry because they are implemented as a new business model capable of meeting the demand for quality products and services (García-Pozo et al., 2015; Alonso-Almeida et al., 2016). Although tourism and the hospitality industry can provide benefits to the environment through conservation and preservation of nature, their business activities also have the potential to damage the environment. The hospitality industry places pressure on natural resources through the consumption of food, water, energy, and raw materials. Other negative environmental impacts from tourism and the hospitality industry include pollution through air emissions, waste, and noise. The physical impacts of the hospitality sector on the environment include construction activities, infrastructure development, deforestation, and unsustainable land use (Kolawole et al., 2016; Pramanik & Ingkadijaya, 2018).

The supply chain in the hospitality industry includes suppliers, customers, clients, and stakeholders. The supply chain in the hospitality industry aims to provide services to consumers (Kothari, 2011). A green supply chain is defined as a strategic practice that can be adopted by the hospitality industry with the aim of transforming it into a more environmentally friendly industry (Migdadi, 2022). Learning that occurs within supply chain member groups can be seen as an important component in improving overall supply chain performance (Chen et al., 2014). In this context, supply chain learning focuses on inter-organizational relationships so that information and knowledge about environmentally friendly technology can be developed. This means that by studying and mastering environmentally friendly technology, companies can generate new ideas that make environmentally friendly technology. As a result, green incremental innovation can be viewed as a knowledge flow involving various organizations, and it is believed that competencies related to supply chain learning play a crucial role in enhancing innovation performance and productivity (Guo et al., 2019).

The hospitality industry in Yogyakarta, Indonesia has experienced rapid growth over the past few years. Generally, hotels offer various amenities and provide convenience to customers. The growth of the hotel industry has brought numerous benefits, but it has also caused problems such as environmental issues. Environmental issues and innovation in the supply chain of hotels in Yogyakarta are closely related. According to the Central Statistics Agency of Yogyakarta in 2024, the rapid development of hotels in Yogyakarta has triggered various environmental problems, particularly related to water availability and waste management. Furthermore, innovation in operations and the supply chain is key to reducing negative impacts and enhancing sustainability. Some hotels have started to implement green incremental innovations such as conducting urban farming on rooftops and processing organic waste into fertilizers. Based on the analysis above, this research aims to further analyze the efforts made by hotels in Yogyakarta in relation to the influence of green entrepreneurial orientation on green incremental innovation mediated by supply chain learning.

## Literature Review

### Hypotheses Development

The dynamic capabilities theory by Teece et al. (1997) explains how companies respond to environmental changes by managing resources and internal processes to create innovation and sustainable competitive advantages. In the context of green entrepreneurial, these dynamic capabilities relate to a company's ability to integrate, reconfigure, and leverage resources to produce environmentally friendly innovations. Companies with green entrepreneurial orientation must not only comply with environmental protection principles but also follow an entrepreneurial orientation based on company development. Entrepreneurial-oriented companies must be accompanied by innovation, risk-taking, and initiative. Jiang et al. (2018) argue that green entrepreneurial orientation refers to a company's proactive tendency to identify and capitalize on environmentally friendly business opportunities based on risk and benefit considerations. Fussler and James (1996) proposed the concept of green innovation, which first refers to improving environmental performance, including product innovation through the development and utilization of new processes, new products, and new services. Borghesi et al. (2015) note that green innovation can reduce the negative impact of economic activities on the environment. Green innovation is considered key to addressing sustainability issues and enhancing organizational competitive advantage (Tamayo-Orbegozo et al., 2017). Based on different levels, green innovation can be divided into green incremental innovation (Dai et al., 2015). Referring to Chen et al., (2014), who define green incremental innovation as improving, adapting, strengthening, or enhancing existing environmental technologies. Entrepreneurial orientation can have a direct or indirect impact on corporate innovation (Li et al., 2017). More specifically, entrepreneurial activities essentially consist as well as green incremental innovation and improvements to existing processes, suggesting that entrepreneurial orientation can drive green incremental innovation within a company.

#### **H1: Green Entrepreneurial Orientation Has a Positive Effect on Green Incremental Innovation.**

The theory of dynamic capabilities by Teece et al. (1997) can serve as a foundation for green entrepreneurial orientation to achieve a supply chain learning. Environmentally and socially oriented green entrepreneurial, when combined with dynamic capabilities, enables companies to adapt to changes, identify new opportunities, and manage resources effectively to achieve sustainability goals within the supply chain. Entrepreneurial orientation is a powerful learning strategy within organizations to encourage and support exploration and risk-taking in developing technological innovations (Teng, 2007). Companies that focus on entrepreneurship generally strive to grow rapidly without paying attention to the knowledge resources they have and need. Therefore, a focus on entrepreneurship can lead to a scarcity of knowledge resources within a business organization, forcing companies to seek resources from outside the company and enhance knowledge between organizations, such as supply chain learning (Teng, 2007). Entrepreneurial orientation has a beneficial effect on the learning process and resources within alliances and can assist management in the supply chain learning process (Shan et al., 2016). **H2: Green Entrepreneurial Orientation Has a Positive Effect on Supply Chain Learning.**

The dynamic capabilities theory pioneered by Teece et al. (1997) can be linked to the supply chain learning and green incremental innovation. Dynamic capabilities refer to a company's ability to adapt and respond to environmental changes, which is highly relevant in the context of sustainability. The supply chain learning focuses on environmentally friendly practices in the supply chain, while green incremental innovation promotes sustainable product and process innovations, both of which require dynamic capabilities to succeed. The concept of supply chain learning originates from interorganizational learning theory and involves ways of collaborating between members of an

organization to create collective knowledge. There is a flow of knowledge within the supply chain, enabling members of the supply chain to obtain information through interorganizational learning, which can lead to mutually beneficial cooperation. Supply chain learning is a resource that contributes to supply chain performance (Chen et al., 2014; Zhu et al., 2018). The ability to learn together among supply chain partners has a positive impact on innovation (Jer et al., 2017). It is difficult for companies to achieve green innovation, so collaboration with related organizations is crucial for creating green innovation (Zeng et al., 2017). Guo et al. (2019) argue that the acquisition of external knowledge can play a positive role in promoting green innovation. Learning among supply chain partners can drive improvements in information and knowledge to create green innovation. Companies can achieve the exchange of information related to green technology, knowledge sharing, and green innovation through supply chain learning, and ultimately promote the company's green incremental innovation.

**H3: Supply Chain Learning Has a Positive Effect on Green Incremental Innovation.**

The dynamic capabilities theory by Teece et al. (1997) can serve as a framework for understanding how companies can achieve green entrepreneurial orientation that leads to a supply chain learning and green incremental innovation. Dynamic capabilities are the abilities of companies to adapt and create sustainable competitive advantages in a changing environment. In a green context, this means that companies need to develop the capability to integrate sustainability principles throughout their entire value chain, from production to distribution, so that green innovation is enhanced. The application of green entrepreneurial orientation enables companies to develop internal strengths within the organization, which not only supports companies in creating innovative environmentally friendly products but also helps to improve environmentally friendly technology components (Jiang et al., 2018). Learning in the supply chain plays an important role in green entrepreneurial orientation to create innovation. Green entrepreneurial orientation plays an important role in supply chain learning, enabling companies to improve their ability to develop new environmental products (Fernández-Mesa et al., 2015). Ying et al. (2018) explain that green entrepreneurial orientation plays a role in enhancing supply chain learning as well as green incremental innovation. **H4: Green Entrepreneurial Orientation Has a Positive Effect on Green Incremental Innovation through Supply Chain Learning as a Mediator.**

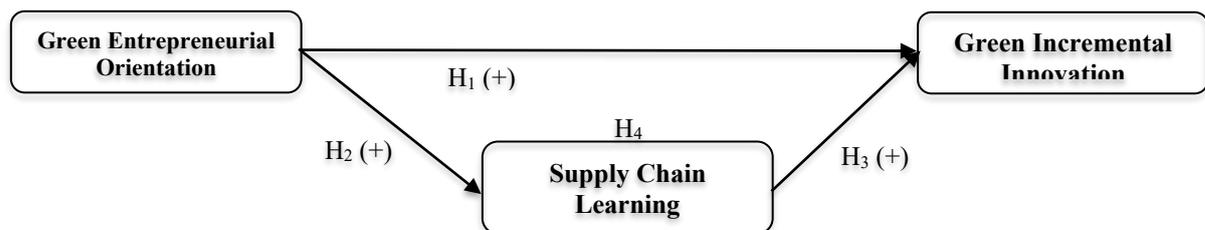


Figure 1. Research Framework

## 2. METHOD

The population of this study was hotel employees in Yogyakarta, Indonesia. The sampling technique used in this study was purposive sampling with several predetermined criteria, including hotel employees who have worked or have at least two years of experience, understand green entrepreneurial orientation, supply chain learning, and green incremental orientation, and have attended seminars related to the environment. Based on these criteria, a sample of 85 respondents was obtained.

A Likert scale with scores ranging from 1 to 5 was used to assign values to each indicator item that respondents could select as their answers. The questionnaire included five items for the green entrepreneurial orientation (GEO) variable adapted from Jiang et al. (2018), five items for the supply chain learning (SCL) variable adapted from Zhu et al. (2018), and four items for the green incremental innovation (GII) variable adapted from Dai et al. (2015). This study uses structural equation modelling (SEM) analysis with the partial least squares (PLS) technique using Smart PLS version 4.0.

Validity, reliability, and hypothesis testing are all part of the data testing that is done. The outer loading value of each indicator item, Cronbach's alpha, and composite reliability values for each variable are examined in order to assess validity testing. If a variable's composite reliability value is higher than 0.7 and its Cronbach's alpha value is larger than 0.6, it is deemed reliable. Lastly, each hypothesis's p-value was examined as part of the hypothesis testing process. If the p-value is less than 0.05, the hypothesis is accepted. Every criterion for data testing was modified from the claims made by Hair et al. (2021).

### 3. RESULTS AND DISCUSSION

#### Results

Table 1 shows the characteristics of 85 respondents classified by gender, age, education level, work experience, and salary. Based on the analysis of respondent characteristics, the majority were male (55 respondents) and female (30 respondents). The respondents are predominantly in the 17-21 age range, with 30 respondents. The educational level of the respondents is predominantly senior/vocational high school, with 58 respondents. The majority have 1 - 3 years of work experience with 62 respondents, and the majority of respondents earn IDR 2.000.001 - IDR 3.000.000 with a total of 28 respondents.

Table 1. Characteristics of Respondents

Characteristics	Frequency	Percentage
Gender		
Male	55	64.71 %
Female	30	35.29 %
Age		
17-21 Years Old	30	35.29 %
22-26 Years Old	15	17.65 %
27-31 Years Old	9	10.59 %
32-36 Years Old	17	20 %
37-41 Years Old	9	10.59 %
42-46 Years Old	5	5.88 %
Level of Education		
Senior/Vocational High School	58	68.24 %
Diploma	6	7.06 %
Bachelor	20	23.53 %
Master	1	1.18 %
Work Experience		
1 – 3 Years	62	72.94 %
4 – 6 Years	10	11.76 %
7 – 9 Years	6	7.06 %
> 9 Years	7	8.24 %
Salary		
IDR 500.001 - IDR 1.000.000	18	21.18 %
IDR 1.000.001 - IDR 2.000.000	11	12.94 %

Characteristics	Frequency	Percentage
IDR 2.000.001 - IDR 3.000.000	28	32.94 %
IDR 3.000.001 - IDR 4.000.000	10	11.76 %
IDR 4.000.001 - IDR 5.000.000	7	8.24 %
> IDR 5.000.001	11	12.94 %

Figure 2 and Table 2 shows the Smart PLS output model, which displays the outer loading values of each indicator item for each variable. The results are then tabulated in Table 2. The outer loading values for each indicator item are proven valid and all were greater than 0.7 (Hair et al., 2021).

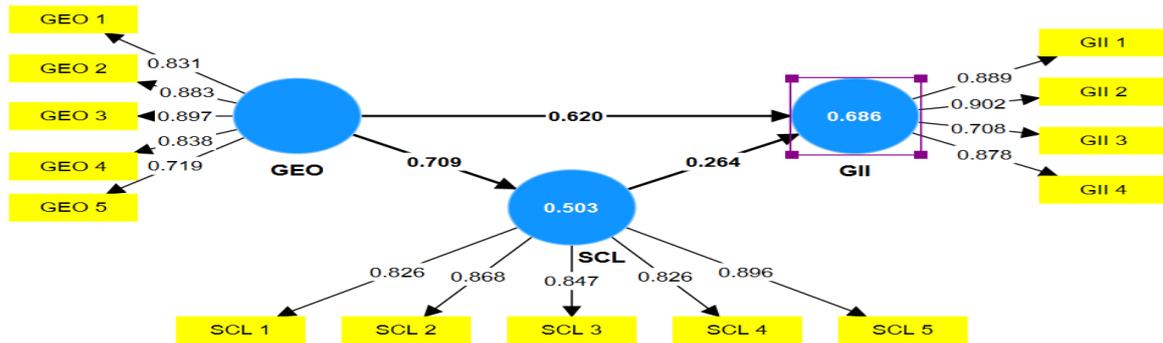


Figure 1: Model Output from Smart PLS

Table 2. Result of the Validity Test

Indicator	Green Entrepreneurial Orientation	Green Incremental Innovation	Supply Chain Learning
GEO 1	0.831		
GEO 2	0.883		
GEO 3	0.897		
GEO 4	0.838		
GEO 5	0.719		
GII 1		0.889	
GII 2		0.902	
GII 3		0.708	
GII 4		0.878	
SCL 1			0.826
SCL 2			0.868
SCL 3			0.847
SCL 4			0.826
SCL 5			0.896

Table 3 shows the reliability test results tabulated. Based on these results, it can be concluded that the four variables in this study are reliable. This is evidenced by Cronbach's alpha and composite reliability values for each variable being above 0.6 and 0.7 (Hair et al., 2021).

Table 3. Result of the Validity Test

Variable	Cronbach's Alpha	Composite Reliability
Green Entrepreneurial Orientation	0.891	0.920
Supply Chain Learning	0.906	0.930
Green Incremental Orientation	0.867	0.910

Table 4 shows the tabulation of the partial hypothesis and mediation test results. The hypothesis test was measured using a p-value of less than 0.05 to declare the hypothesis accepted (Hair et al., 2021). Based on the results of the partial hypothesis tests, all hypothesis was supported because they had a p-value less than 0.05 (green entrepreneurial orientation has a positive effect on green incremental innovation and supply chain learning, supply chain learning has positive effect on green incremental innovation). The mediation hypothesis test shows that supply chain learning mediate the relationship between green entrepreneurial orientation and green incremental innovation.

Table 4. Result of Hypothesis Test

Hypothesis	Original Sample	Sample Mean	Standard Deviation	T Statistics	P Value
Green Entrepreneurial Orientation → Green Incremental Innovation	0.620	0.621	0.088	7.030	0.000
Green Entrepreneurial Orientation → Supply Chain Learning	0.709	0.708	0.064	11.004	0.000
Supply Chain Learning → Green Incremental Innovation	0.264	0.263	0.089	2.965	0.003
Green Entrepreneurial Orientation → Supply Chain Learning → Green Incremental Innovation	0.187	0.186	0.066	2.842	0.005

## Discussion

The results of the first hypothesis testing show that green entrepreneurial orientation has a positive effect on green incremental innovation. These findings are consistent with the research conducted by Muangmee et al. (2021). Green entrepreneurial orientation is an innovation that can facilitate green incremental innovation or green innovation, ultimately improving company performance. The dynamic capabilities theory by Teece et al. (1997) serves as an important foundation for companies to develop green entrepreneurial orientation and achieve success in green incremental innovation. The ability to identify, leverage, and respond to environmental changes, as well as to develop sustainable innovations, greatly depends on the dynamic capabilities of the company. When company employees possess green entrepreneurial orientation, it can drive green incremental innovation, as evidenced by the creation of environmentally friendly product innovations.

The results of the second hypothesis test show that green entrepreneurial orientation has a positive effect on supply chain learning. These findings are consistent with those of Shan et al. (2016), who found that companies with green entrepreneurial orientation tend to create an environment that encourages learning behavior and provides direction and space for learning within the company. The dynamic capabilities theory proposed by Teece et al. (1997) implies that companies with an ecological orientation tend to be more capable of developing dynamic capabilities relevant to sustainable business. Green entrepreneurial orientation can drive companies to seek opportunities for green innovation and invest in the development of necessary dynamic capabilities. Additionally, supply chain learning plays an important role in supporting dynamic capabilities as it allows companies to acquire knowledge and best practices from across the supply chain to enhance sustainable performance. Additionally, green entrepreneurial orientation provides management support for the supply chain learning process. This means that when a company adopts green entrepreneurial

orientation, it can encourage learning behavior, facilitate a learning environment, and provide support for the supply chain learning process.

The results of the third hypothesis test show that supply chain learning has a positive effect on green incremental innovation. These findings are consistent with the research by Ying et al. (2018). Supply chain learning focuses on collaboration between companies to share and develop information and knowledge about environmentally friendly technologies. In other words, companies can create innovative ideas in their environmentally friendly technologies by learning and mastering the environmentally friendly technological resources possessed by their partners. Specifically, there are differences in the types of resources and capabilities possessed by partners in the environmentally friendly technology supply network. Environmental conditions and the fact that their environmentally friendly innovations can complement each other through supply chain learning. This means that companies that focus on supply chain learning collaboration with their business partners are also able to share information, develop technology, and green incremental innovation. The dynamic capabilities theory by Teece et al. (1997) provides a framework for companies to develop supply chain learning and green incremental innovation. The ability of a company to identify opportunities, respond to changes, and transform allows the company to learn from sustainable practices and implement green innovations within the supply chain. In turn, supply chain learning and green incremental innovation can enhance a company's long-term competitiveness, especially in the context of climate change and increased environmental awareness.

The results of the fourth hypothesis test show that supply chain learning mediates the relationship between green entrepreneurial orientation and green incremental innovation. This study is in line with the research by Ying et al. (2018) that supply chain learning plays a mediating role, where higher supply chain learning capabilities can be strengthened by higher green entrepreneurial orientation, and as a result, green incremental innovation also increases. The dynamic capabilities theory by Teece et al. (1997) explains how green entrepreneurial orientation can be a key driver of green incremental innovation through supply chain learning. Specifically, green entrepreneurial orientation, which focuses on environmentally friendly business practices, encourages learning in the supply chain, ultimately leading to better innovation in sustainable products and processes.

#### 4. CONCLUSION

Based on the results of the analysis, this study concludes that green entrepreneurial orientation has a positive effect on supply chain learning and green incremental orientation. Supply chain learning has a positive effect on green incremental orientation. Supply chain learning mediate the relationship between green entrepreneurial orientation and green incremental orientation. This study has limitations, including the minimal number of respondents, which means that the results may not represent the overall opinions of all hotel employees in Yogyakarta, Indonesia. Based on these limitations, the future research should involve more respondents so that the results can be more accurate, more validated, and a better reference than previous research. The more respondents involved, the more the researcher will understand and comprehend each individual's various opinions. Future research is also encouraged to expand the scope of the research object, thereby broadening the population or sample size to ensure the accuracy and validity of the data used.

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