

THE ROLE OF GEOLOGICAL RELATIONSHIP AND BRAND OF GEOPRODUCT ON REGIONAL DEVELOPMENT IN SAMOSIR ISLAND OF GEOPARK CALDERA TOBA WITH MEDIATING METHOD

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Abstract: Geoproductions have a specific philosophy, a geological relationship that is visible and understandable through the utilization of geological and geomorphological features from the diversity of geological, biological and cultural heritage then strengthened by geo-brand as added value of the product. As local products of certain region, geoproductions as a unique tourism product, through membership of Geopark Global Network (GGN), play a role in identifying the geopark itself and become market tools where geo-brands can take it. Samosir Island, as part of Toba Caldera Geopark, is the world's greatest Caldera with outstanding potential, became a member of GGN in year of 2020. Data processing in this study used smartPLS SEM (Partial Least Square - Structural Equation Modeling) software. Various tourism products as geoproductions activity grow, whereas geoproductions are expected to follow the philosophy then becoming a sector in the development region of geopark, yet have no geo-brand. The geological relationships significantly impact the rise of tourism activities in the regional development of Toba Caldera. This is achieved by incorporating the products' geological, biological, and cultural factors. Using geological features must catch up to its potential as a world heritage site. Therefore, it is crucial to maintain these highly delicate elements through geotourism. A study was conducted on geoproduct actors from the supply side of tourism to see how the geological relationship is related to various products that can provide regional development in principle of sustainability and how geoproduct actors comprehend geo-brand on their products as an identity of worldwide product.

Key words: Regional Development, Geoproductions, Geological Connections and Geo-brand

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INTRODUCTION

Regional development is complex and comprehensive, involving stakeholders in a participatory manner at local, regional and global dimensions, but is often unbalanced and unevenly distributed towards welfare (Rustiadi, 2022; Amini et al., 2021; Brinkley and Hoch, 2021; Mukhopadhyay, 2019; Soja, 2009). Brundtland (1987) with Our Common Future and then the Prism of Sustainability by Eddins and Cottrell (2013); Spangenberg and Valentin (1999), in the economic, social, institutional, biogeophysical, geographic and geographic location dimensions into a multidimensional system in sustainable development (Ruggerio, 2021; Sirojuzilam, 2016). Until 2020, achieving the 2030 Agenda SDG's on 17 goals and 169 targets of sustainable development was obtained in the dimensions of society, economy, environment, means of implementation and cooperation in different countries (Huan et al., 2021). Tourism is the ninth highest growth sector in the world, the last five years provided one-fifth of new jobs (Alamineh et al., 2023; Ólafsdóttir and Tverijonaite, 2018). In the tourism trend, the fastest growing market segment in nature tourism focuses on geological features and geomorphological landscapes, heritage, aesthetics, culture, biodiversity conservation and the well-being of its inhabitants through appreciation and learning (Frey, 2021; Dowling and Newsome, 2018; <https://www.nationalgeographic.com>).

Geoproductions emerged along with tourism, as tourism products inspired by geological diversity as an attraction, as well as tools in local economic development; conservation of heritage sites strengthens the relationship between humans and the earth in scientific interpretation and diffusion (Rodrigues et al., 2021; Pásková et al., 2021; Chi, 2018; Yuhora et al., 2014; Compňová, 2010). Aspects of product development are essential and realized in order to meet the objectives of geoparks in

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global networks in sustainable development (Yuliawati et al., 2022; 2021; Geert, 2019; Andraşanu et al., 2018; Arjana et al., 2018; Carvalho and Rodrigues, 2017). In 2020, the Toba Caldera Geopark was accepted as a member of the GGN, where the Lake Toba Region has a natural phenomenon of world heritage with the class Outstanding Universal Value (Kemenparekraf, 2020; <https://calderatobageopark.org/>) but until now it has not had geo brand on geoproducts. It is interesting to examine how the development of products that utilize aspects of its development aspects as a unique product of the Samosir Island region in the Toba Caldera Geopark in regional development that prioritizes the concept of sustainability in the global market (Ginting et al., 2020a; Ginting et al., 2021).

Objectives:

1. To identify the relationship between geological factors and brand to Geoproduct variables
2. To identify the relationship of geological relationship variables to regional development through Geoproduct variables.

LITERATURE REVIEW

Geoparks as earth parks are an alternative to sustainable development where in achieving these goals, parks utilize residents' network activities, knowledge and labour (<https://en.unesco.org/global-geoparks>). Geotourism is a pioneer geopark that meets geological-based requirements where the management of nature tourism promotion focuses on geology and landscape, biodiversity conservation and public education as well as local economic development and community participation for tourist satisfaction (Dowling, 2018; Ginting et al., 2018; Farsani et al., 2011; Dowling and Newsome, 2014, 2010). Geoproducts are local products or the integration of traditional products with new concepts and interpretations in entrepreneurship. Inspired by the geodiversity of a region, as a symbol of heritage and geomorphology in a geopark (Rodrigues et al., 2021; Farsani et al., 2012a; Carvalho and Rodrigues, 2017). Geoproduct is a tourism product of activities, services, and benefits and is a tourist experience starting when leaving the place of origin to the tourist area until returning to the place of origin which consists of destination attractions, destination facilities, accessibility, image, and price as products in the tourism industry that visitors enjoy (Medlik and Middleton, 1989).

Geoproduct are tourism products that are different from others because they have a philosophy that is realized and implemented as aspects of its development aspects, namely (1) The Identity Axis as a Geological Relationship explains cultural identity in geological diversity between society and the natural environment where it lives; (2) Product Development Axis as an aspect of Economic Feasibility explains Geoproduct productivity in sustainable tourism; (3) Management Axis as a Partnership aspect explains cooperation in geoproduct productivity: geological relationships, economic feasibility and geopark partnerships embodied in tangible and intangible geoproducts (Rodrigues et al., 2021; Andraşanu et al., 2018). Geoproducts refer to commercially viable services or goods that are derived from the geodiversity of a particular place. In the context of regional development, geoproducts can be used as a territorial marketing strategy (Carvalho and Rodrigues, 2017) where Geo-brand as a communication strategy in the promotion of products globally with elements of geodiversity and geoheritage as the focus as well as added value in the development of products that are environmentally friendly and origin (Yuliawati et al., 2022; Rodrigues et al., 2021; Arjana et al., 2018). Geoproduct development as a product of a geopark area utilizes Geo-brand as a marketing communication strategy. The Geo-brand must be visible and provide benefits in the added value that can bring geopark identity globally (Yuliawati, 2022; Rodrigues et al., 2021; Arjana, 2018; Carvalho and Rodrigues, 2017).

Geological Relationships, one aspect of product development, explains the utilization of the diversity of geological and geomorphological elements, soils and hydrological features as geoheritage (Gray, 2019; Brilha, 2018); abiotic components of geology, microorganisms, fauna, flora and elements of cultural heritage in the form of ideas, ideas, values, norms, activities as inspiration and raw materials either partly or wholly from the geopark area in a product in the form of tangible or intangible which is carried out sustainably (Yuliawati et al., 2022; Pásková et al., 2021; Rodrigues et al., 2021; Bieniek et al., 2019; Liliweri, 2019; Pásková et al., 2021; Andraşanu et al., 2018; Koentjaraningrat, 2009).

Another aspect is Brand has tangible and intangible identity elements, including name, visual logo, and slogan/tagline (Musfar, 2021; Kotler and Keller, 2016; Kotler and Armstrong, 2013). Functions in forming a brand image, informing product specificity (Pan, 2019; Galí et al., 2017). Slogans, short phrases convey descriptive and persuasive information about the tourist destination brand with the function of enhancing the image and existence of the brand and brand differentiation in the minds of consumers, which is effectively obtained through the complexity, length, rhythm and jingle of the slogan plus the influence of the media (Galí et al., 2017; Kohli et al., 2013) on the promotional communication conducted (Musfar, 2021; Kotler and Keller, 2016; Dinar and Hasan, 2018). Pan's research (2019) results on tourism destination slogans, and company products explain that the average number of words in tourism slogans is 3.64 words, and as many as 4.47 other words for slogans of company products and services.

Geo-brands on products provide benefits such as the promotion of geological and geomorphological attractions, creating local economic opportunities through local product development and partnerships and entrepreneurship, attracting investors, standardizing tourism services involving local communities as well as participation and support in the conservation of regional tourism resources (Tosun et al., 2020; Shafiei et al., 2017; Styliadis et al., 2014). In the context of the geo-brand region, it provides identity and regional image of a geopark, increasing regional competitiveness through products by utilizing geological and geomorphological wealth that has international recognition and extraordinary visibility (Geert, 2019; Farsani et al., 2012b; Mckeever and Zouros, 2009). Branding a product on its packaging or tourism facilities has a whole and singular characteristic of the geopark concept (Rodrigues et al., 2021). As explained above, several hypotheses were formulated to obtain answers to research questions, namely (1) There is significant and positive effect of Geological Relationship on Geoproduct; (2) There is significant and positive effect of Geo- brand on Geoproduct; (3) There is significant

and positive effect of Geoproduct on Regional Development; (4) There is significant and positive effect of Geological Relationship on Regional Development; (5) There is significant and positive effect of Geo-Brand on Regional Development.

METHODOLOGY

Data Collection

The Study Area is located in Samosir Island, Samosir Regency, North Sumatra Province, part of the Toba Caldera Geopark with an area of approximately 1,130 Km² (Figure 1). The population is geoproduct actors in the category of (1) Tourism Object/ Goods Actors, namely tourist attraction services, artisans, tour guides, and souvenir traders; (2) Accommodation Service Actors, namely homestay actors, hotel actors; (3) Food and Drinking Service Actors: café n restaurant, (4) Tourism Facilities and Infrastructure Actors (Rodrigues et al., 2021; Dryglas, 2014; Medlik and Middleton, 1989) and other Necessity Services such as hawkers and grocery stalls with a population of 1,126 actors through the Slovin formula (Noor, 2014) with an error rate of 5% obtained a sample of 295 respondents with and 27 measurable question items. Data processing in this study used PLS-SEM (Partial Least Square - Structural Equation Modeling) with software SmartPLS 4.0. PLS can explain the relationship between variables and the ability to perform analyses in one test.

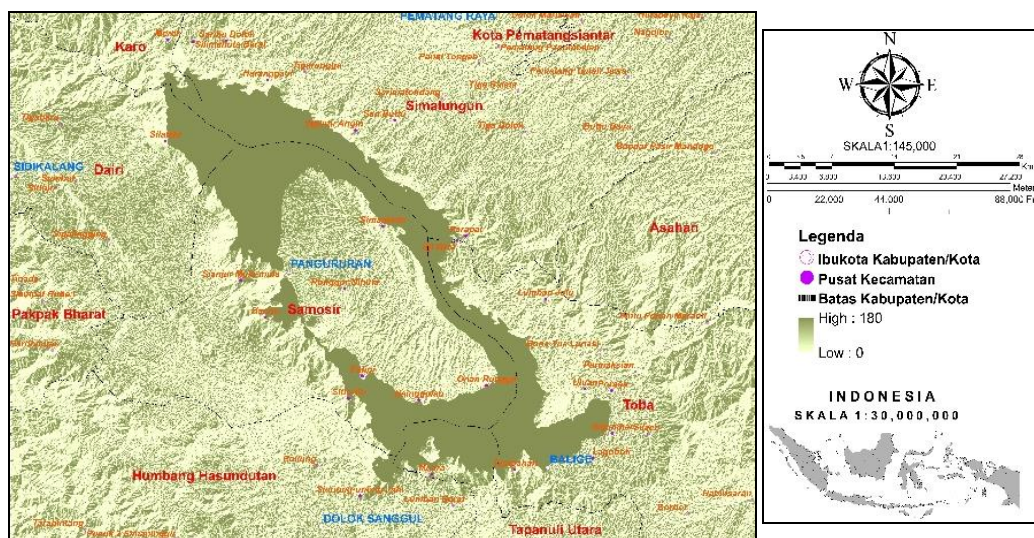


Figure 1. Toba Caldera Geopark (Source: Toba Caldera Geopark Management Agency, Master Plan Geopark Kaldera Toba, 2018)

DATA ANALYSIS

Based on the table below, it can be seen that all questionnaire items have met the convergent validity test standards, namely AVE above 0.5 and factor loading above 0.5, which means that all items are declared valid, and have met the composite reliability test standard which is more significant than 0.7 (Hair et al., 2017; Chin, 2010) which means that all items are declared reliable (Table 1).

Table 1. Indicator Loadings, Cross-Loadings and Reliability Measures (Source: Processed Data, 2022)

Construct	Indicator Item	Instrument Item	Outer Loading	Cronbach's alpha	Composite Reliability (rho_a)	Composite Reliability (rho_c)	AVE
Brand	B1.1	Brand Meaning	0.620	0.758	0.783	0.837	0.511
	B2.1	Brand Usage	0.819				
	B2.2	Standard Brand	0.818				
	B3.2	Promotion Media	0.685				
	B3.3	Promotion Cost	0.599				
Geoproduct	G1.1	Visitor Interest	0.762	0.865	0.868	0.903	0.652
	G1.2	Product Quality	0.753				
	G2.2	Ease of Transportation	0.818				
	G2.3	Availability of Fas	0.890				
HG	G2.4	Feasibility Fas	0.807	0.718	0.779	0.834	0.627
	HG1.1	Geological Utilization	0.806				
	HG2.1	Flora, fauna Utilization	0.718				
PW	HG3.1	Cultural Utilization	0.846	0.927	0.929	0.948	0.821
	PW1.1	Improved Development	0.868				
	PW1.2	Tourism Improvement	0.908				
	PW1.3	Length of Visit	0.922				
	PW2.1	Community Education Improvement	0.925				

The Discriminant Validity test of the reflexive manifest indicator shows

(1) the cross-loading correlation value has a more excellent value with other construct variables (Hair et al., 2017);

(2) the Fornell-Larker Criterion value of each latent variable is greater than the correlation between other latent variables (Chin, 2010; Fornell and Larcker (1981); and

(3) the Heterotrait-Monotrait Ratio / HTMT value on each latent variable < 0.9 (Henseler et al., 2015).

The results of the Discriminant Validity analysis obtained that the Regional Development, Geoproducts, Geological Relationships, and Brand constructs have been met as in HTMT test obtained a value of less than 0.9, which means the discriminant validity value has been achieved (Table 2).

Table 2. Discriminant Validity Heterotrait Monotrait Ratio (HTMT) (Source: Processed Data, 2022)

Construct	B	G	HG	PW
B				
G	0.637			
HG	0.593	0.606		
PW	0.496	0.852	0.553	

Table 3. Analysis Discriminant Validity: Fornell Larcker Criterion (Source: Processed Data, 2022)

Construct	B	G	HG	PW
B	0.715			
G	0.530	0.807		
HG	0.438	0.505	0.792	
PW	0.441	0.765	0.490	0.906

The Fornell Larcker Criterion tests discriminant validity by comparing the square root of the AVE for each construct with the correlation value between constructs in the research model. Based on the test results, it can be seen that all variables have met the criteria where the value of the correlation line between diagonals has been reached, and the value is greater than the correlation between indicators in the variable, which means that discriminant validity has been achieved (Table 3). Testing the validity and reliability of the manifest outer model reflective indicator variable by looking at the results the Discriminant Validity, Internal Consistency and Convergent Validity tests, it was found that the manifest outer model reflective indicator variable was valid and reliable in measuring the construct variable (Figure 2).

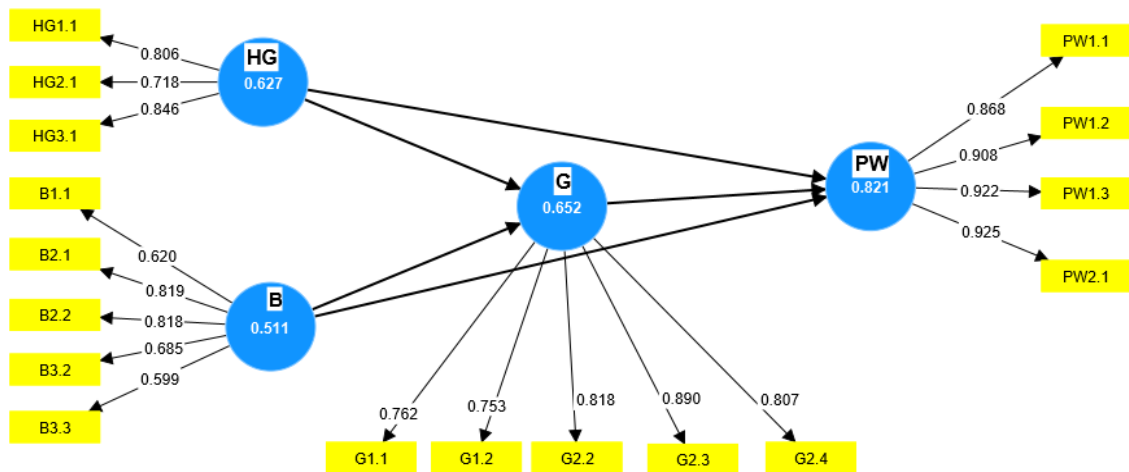


Figure 2. Outer Model Diagram of SEM PLS (Source: Processed Data, 2022)

The results of the SEM PLS bootstrapping output by looking at the t-value and p-value obtained results, namely H1: Geological Relationship to Geoproducts and H2: Brand to Geoproducts; H3: Geoproducts to Regional Development; H4: Geological Relationship to Regional Development and has a significant effect and has a positive direction.

Table 4. Significance Analysis and Hypothesis Decision (Note: p ≤ 0.05 and 1 tail test) (Source: Processed Data, 2022)

Hypothesis	Path	Std Beta	Std Error	t value	p values	Bias	0.050	0.950	Decision
H1	HG → G	0.338	0.055	6.195	0.000	0.001	0.244	0.423	Accepted
H2	B →G	0.382	0.054	7.084	0.000	0.004	0.283	0.462	Accepted
H3	G → PW	0.689	0.051	13.479	0.000	-0.001	0.604	0.772	Accepted
H4	HG → PW	0.134	0.049	2.723	0.003	0.003	0.052	0.215	Accepted
H5	B → PW	0.017	0.054	0.309	0.379	0.004	-0.074	0.103	Not Accepted

Thus, the hypothesis is accepted. While H5: Brand on Regional Development has no significant effect and positive direction, Hypothesis H5 is rejected (Table 5). The results of SEM PLS bootstrapping (Zhao et al., 2010), indirect relationship between Geological Relationship to Regional Development mediated by Geoproduct with coefficient value of 0.233, between the Brand variable to Regional Development mediated by Geoproduct with coefficient value of 0.263 and both are indirect or full mediated (Table 5 and Figure 3).

Table 5. Indirect Path Analysis (Source: Processed Data, 2022)

Path	Indirect Path	Std Beta	Std Error	t value	p values	Bias	0.050	0.950	Decision
Path 1	HG -> G -> PW	0.233	0.040	5.887	0.000	0.000	0.171	0.302	Full Mediated
Path 2	B -> G -> PW	0.263	0.041	6.419	0.000	0.002	0.197	0.332	Full Mediated

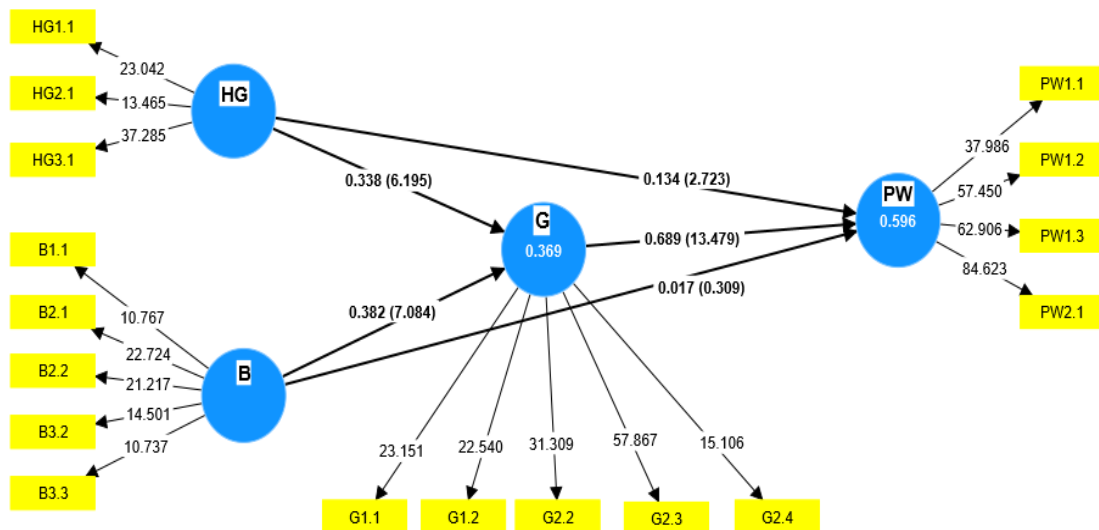


Figure 3. PLS-SEM Inner Model Diagram (Source: Processed Data, 2022)

DISCUSSION

Geological Relationships Effect on Geoproducts

The Geological Relations has a significant effect on the Geoproduct, as seen from the utilization of geological elements, biological and culture as inspiration and elements of forming geoproducts. As the respondent of Geoproduct Actors produce more than one product category at 51.5% and even those who produce three categories of goods, services/activities, and infrastructure at 18%. Individual Geoproduct Actors include artisans, bicycle rentals, and tour guides as well as other Geoproduct Actors have homestay inns Rumah Bolon (Figure 4A), souvenir shops and also as tour dancers of the Sigale - Gale Statue attraction. Utilizing cultural elements is more desirable because it provides more income than geological elements or biological. In contrast, due to high costs, geological elements still need to be widely utilized as products and still require more understanding in their management.

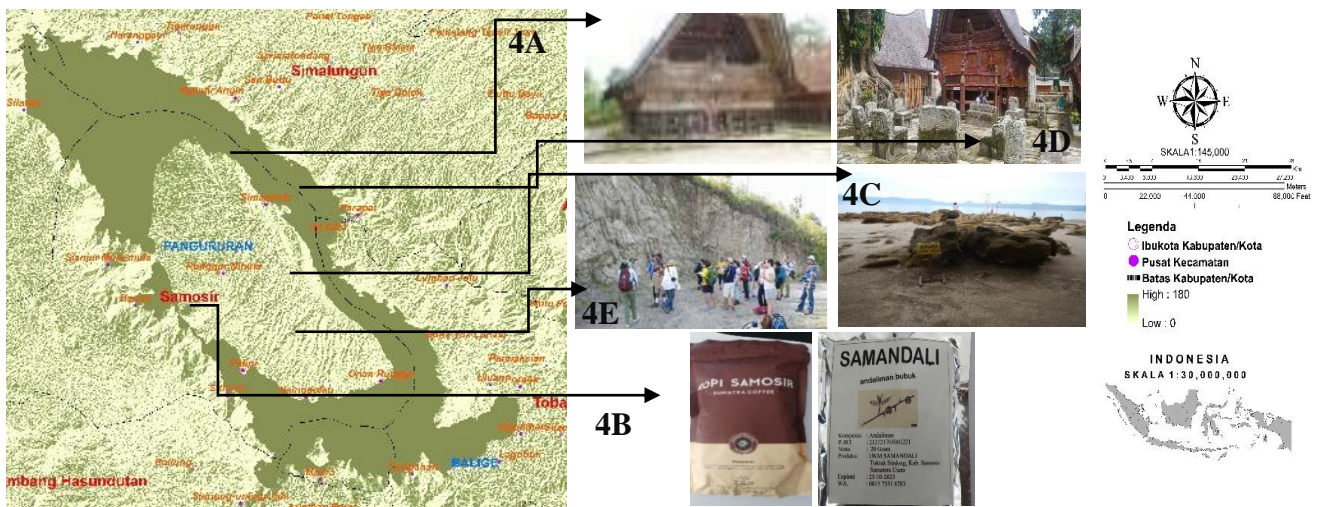


Figure 4. Geoproducts in Samosir Island of Geopark Caldera Toba (Source: Processed Data, 2022)

Brand Effect on Geoproducts

The Brand has a significant effect on the Geoproduct which means that the increase in Brand, as seen from meaning, elements, standard used, promotion media and cost will affect Geoproduct activities. The meaning of the geo-Brand is mostly inspired from cultural value, geological, biological which explains the identity and uniqueness of Lake Toba Region products. Brand elements seen from name, logo and tagline on geoproducts related to geological elements, biological and culture element with illustrations Lake Toba, coffee plants, andaliman, tradisional script (Figure 4B). Various Geoproducts have individual brands and additional brands depending on sponsorship or donations of government-assisted partnerships from the production generally placed on the back of the packaging. On geoproducts category of service/attraction, are using brand of Management Agency Institution, UNESCO and partnership funding institution.

Promotion are important and routinely carried out in budget needed through digital by Geoproduct Actors as marketing tools, spreads information, influences, persuades persuasively the visitors (Musfar, 2021; Kotler and Keller, 2016; Tjiptono, 2008). Furthermore, promotion substance related to Toba Caldera Geopark, was not much found on the product nor its packaging or even on the geoproduct facilities but more about individual tourism products promotions. This condition was also explained by the Samosir District Cooperatives and UMKM Service and Grocery Stores.

However, there is no Geo-brand in represents the Toba Caldera Geopark on various geoproducts that carries the identity, character, and value of the geopark (Yuliawati, 2022; Rodrigues et al., 2021; Arjana, 2018; Farsani et al., 2012b; Carvalho and Rodrigues, 2017). No specific brand on geoproduct as identity of geopark in which Management Agency/North Sumatra Provincial Tourism Office stated about it. Realizing the economic added value, Geopark Actors are willing and strive to adjust product quality to these standards to be worthy of using the Geo-brand.

Geoproducts Effect on Regional Development

Geoproduct variable has a significant effect on the Regional Development as seen from Product Quality and Product Service Level. As in the Province Regional Development Planning 2019-2024, tourism sector development imply sustainable tourism that enhanced benefit on local communities and attract tourists in area of Geopark Caldera Toba (Rusata et al., 2022; Kemenparekraf, 2020).

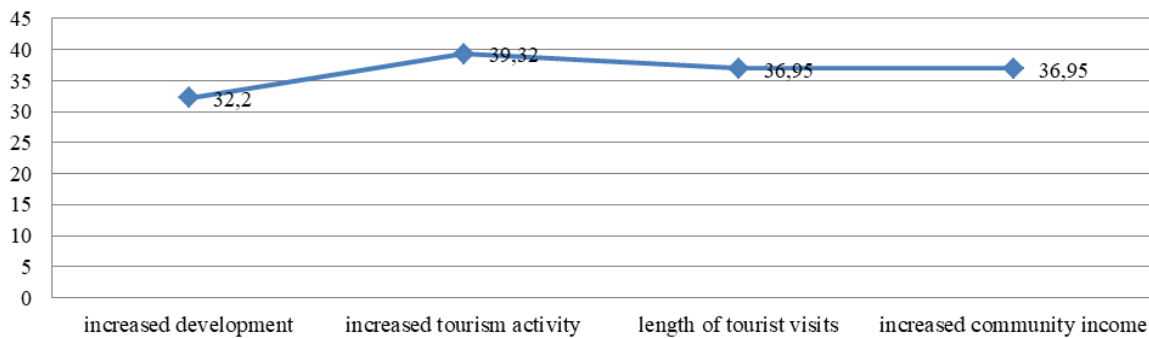


Figure 5. Regional development on Caldera Toba (Source: Authors, 2023)

After being assigned of the Geopark Caldera Toba, more infrastructure facilities, goods, and services available, and community activities have increased both in terms of, type, intensity, services of tourism sector build by the government and private sector. Increasing of tourism activities 49.49%, the length of stay 48.74% as well as increasing income 48.14% mentioned by Geoproducts Actors on Samosir Island. Geopark, a concept of regional development through tourism, increases socioeconomic activities through sustainable development by attracting visitors, income local communities and conservation (Sirojuzilam, 2016; Farsani et al., 2011; Frey et al., 2006). However, some of Geoproduct actors has never even heard of geoproducts concept where they are direct actors in these activities.

Scenery of Lake Toba and cultural value on Batu Hoda Beach (Figure 4C), mostly inspired creativity and develop various geoproducts on 91.18% stated by Geoproduct Actors as seen from the growth and emergence of 44.44% new business of respondent activities within 2-5 years from establishment of the Geopark Caldera Toba began on 2020 such as transportation, accommodation, places to eat and drink, shops, entertainment, activity facilities, and hotel services to meet the needs of tourist satisfaction (Pitana, 2020; Dryglas, 2012, 2014; Hal, 2011).

Geological Relations Effect on Regional Development

Geological Relations has a significant effect on the tourism activity and has improved Regional Development from the utilization of geological, biological and cultural elements as inspiration and forming elements of geoproducts as well as increasing the local community income in the area of geopark (Yuliawati et al., 2021; Rodrigues et al., 2021; Andraşanu et al., 2018; Farsani et al., 2012b; Compl'ová, 2010).

The complex geological diversity of geological elements in Samosir Island makes it an ideal international geoproducts as tourism objects Stone Chair of King Siallagan (Figure 4D). Integration of geological, biological and cultural elements in the productivity of geoproducts is needed to provide conservation balance as well as preparing local human resources as the main actors on Figure 4E (Muzambiq et al., 2021).

Brand Effect on Regional Development

The Brand doesn't effect Regional Development as in the Samosir Island area, no destination brand but individual brand equipped with a companion brand from various institutional assistance and sponsorship on products, which are expressed in elements in name, logo illustrations and taglines. Promotion run with little substance information about Geopark Caldera Toba on product packaging, location of services and Geoproduct activity took place.

The Toba Caldera Geopark, which has only been established in 2020. The absente of geo-brand explains that there is not yet a strong brand as a promotional tool for geoproducts, therefore various promotional activities and events to promote geoproducts and geoparks are not optimal on a regional scale let alone on a global scale. Likewise, efforts to geo brand have not been carried out optimally and adequately by the Geopark Management Agency/Provincial Tourism Office and Region Tourism Office;

CONCLUSION

Geological Relationships affect thus will increase Geoproducts activities. Using cultural elements in products is more desirable and provide more income than biological and geological elements. The utilization of geological elements needs more attention because it requires more handling to become a tourism product. Geological Relationships affects

and increase tourism activities on Regional Development inspired and utilized geological, biological and culture elements inclusively on Toba Caldera geoproducts. Utilization of geological elements is less compared to its world heritage class potential thus, which is very fragile need to be conserved through geotourism.

The Brand effect and increase on Geoproduct activities in where affect Geoproduct but as individual brand which seen on illustrations of Lake Toba, coffee plants, andaliman, traditional script on name, logo and tagline and brand of Institution as well as partnership funding institution but less information related to geopark substance. Therefore less impact on Regional Development as an ambassador of Toba Caldera Geopark to identity and promote tool on a regional scale to global scale. As a tourism product with a specific philosophy, one of which is Geological Relations (Rodrigues et al., 2021; Andraşanu et al., 2018), focusing on landscapes and geo-heritage sites where innovation products as strategy of new tourist attraction. (Ginting et al., 2018; Chi et al., 2018) and geobrands provide added value as an identity and promotional tool on a regional to global scale (Yuliawati et al., 2022; Rodrigues et al., 2021; Arjana et al., 2018).

Through tourism products as Geoproducts, increasing Regional Development activity in balanced, providing opportunities for the local economy as well as conservation of geological, biological and cultural diversity in sustainable (Rustiadi, 2022; Ruggerio, 2021; Amini et al., 2021; Brinkley and Hoch, 2021; Mukhopadhyay, 2019; Sirojuzilam, 2016).

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