

# INNOVATION STRATEGY OF YOUTH-LED SMALL TECHNOLOGY FIRMS IN THE GEOSPATIAL TECHNOLOGY INDUSTRY

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## Abstract

This study explores the innovation process and product development strategies implemented by a small-scale geospatial technology company led by young professionals, focusing on two flagship digital products, namely the .GIS platform for digital map creation and Weather Targeting Automation (WTA). The analysis in this study employs the Open/Closed Innovation framework to examine how the innovation process takes place within the company. In addition, the author also applies the Market Pull and Technology Push frameworks to analyze the company's geospatial-based product development strategies. As a result of the analysis of the innovation process, the company demonstrates a relatively complex innovation process, as although technology development is carried out independently by the internal team, the .GIS platform product can only be utilized by end users after entering the co-creation stage. The development process of technological products is also conducted through a combination of market pull and technology push strategies, indicating that the integration of these two product development strategies is feasible for the company.

**Keywords:** Open Innovation, Closed Innovation, Market Pull, Technology Push, Geospatial Technology

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## 1. INTRODUCTION

Indonesia remains behind in the field of geospatial digital product development, as spatial data processing is still largely dependent on foreign products. Despite the availability of many digital talents with the potential to develop digital products, participation in the geospatial technology field remains limited. To understand how geospatial digital product development companies are able to survive amid the influx of foreign technologies, it is important to examine the innovation processes and product development strategies they implement.

Indonesia remains behind in the development of geospatial digital products, as spatial data processing is still largely dependent on foreign products (Wibowo & Rialdi, 2023). Although there are many digital talents with the potential to develop digital products, involvement in the geospatial technology field remains limited. To understand how geospatial digital product development companies are able to survive amid the influx of foreign technologies, it is important to examine the innovation processes and product development strategies they implement (Sarwanto, 2022).

This study is conducted in a small-scale geospatial technology company with fewer than 20 employees and led by a young entrepreneur. Established in 2016, the

company initially provided information technology development services related to earth sciences or mapping to improve safety and reduce disaster risk, and later evolved into a spatial technology development company. With this business focus, the company's customers are predominantly engaged through a Business to Business (B2B) scheme, mainly consisting of government institutions and corporations. Given the niche nature of the geospatial technology industry, examining how the company survives by producing products that meet market needs becomes an interesting subject of study. This research focuses on analyzing the innovation processes occurring within the company through the closed–open innovation framework, as well as identifying the strategies employed by the company in developing map-based technology products in order to ultimately achieve product–market fit based on the market pull and technology push frameworks.

The concept of innovation in business is not limited to the services or products delivered to customers; innovation can also occur in company operations or the business model employed to achieve organizational goals and maintain market presence (Purcell, 2019). Within the innovation process, two commonly used approaches can be identified. The first is an innovation process that begins with idea generation and is developed and implemented internally by the company's own team, referred to as Closed Innovation (Innovation Development, 2018). In contrast, innovation that involves external parties and utilizes some or all external resources is known as Open Innovation. Open Innovation is an approach that focuses on acquiring knowledge or information from outside the company and subsequently using it to develop the business or organization through new products and services, new operations, or new systems; in other words, it involves the integration of internal and external ideas into organizational architectures and systems (Chesbrough, 2003).

Approaches to product and service development can be categorized into Market Pull and Technology Push. Market Pull uses user or market needs as the primary inspiration to define problems, which are then addressed by companies or producers through the provision of appropriate products or services. On the other hand, the Technology Push strategy introduces newly developed products or services to users or the market as novel solutions (Dixon, 2001). The stages of Technology Push are distinctive in that they begin with research or knowledge accumulation without direct reference to user or market needs, which is later elaborated into products or services offered to the market (BBC, 2012).

The innovation process in product or service development is carried out by companies with the aim of delivering value to users, commonly referred to as achieving "fit" (Johansson, 2017). Osterwalder et al. (2014) define the condition of "fit" between what a company offers and what customers require through three stages, with product–market fit positioned at the second stage. At this stage, the products or services provided by the company are already able to address customer problems and generate value, although they have not yet reached a scalable business phase. Given

that the company examined in this study remains small in scale, ensuring that the geospatial technology products developed have reached the product–market fit stage is essential for assessing whether the intended benefits have been achieved.

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## **2. METHODOLOGY**

This research is exploratory, employing a qualitative approach to examine the innovation processes and product development strategies within a small-scale geospatial technology firm. The research design is descriptive, intended to illustrate the innovation characteristics and practices of the company within the context of the niche geospatial technology industry.

Data was gathered through three sequential methods: literature review, observation, and semi-structured interviews. Secondary data was sourced via a literature review of company documents and information regarding products and services found on digital platforms, including both websites and social media. Non-participant observation was carried out as the researcher monitored business operations and innovation-related activities. Additionally, participant observation was conducted by using the company's products and services firsthand to gain a user-centric perspective. These observations took place between October 2021 and May 2022. Semi-structured interviews with important stakeholders, including the CEO, marketing personnel, and R&D personnel, were used to gather primary data. Although these interviews adhered to a predetermined framework, they were still adaptable to enable a more thorough examination of subjects pertinent to the business's innovation and product development processes.

Following a gathering of primary and secondary data, an abductive qualitative analysis was carried out to connect the applied theoretical framework with empirical findings. This framework comprises Market Pull and Technology Push for evaluating the company's product development plans, as well as Open and Closed Innovation for reviewing innovation processes. In order to comprehend the firm's innovation plans, the results were finally consolidated using a theme analysis.

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## **3. FINDINGS AND DISCUSSION**

The analysis of the innovation process was conducted for the .GIS web product and was not applied to the WTA product, as WTA is still in the product development stage. Meanwhile, the analysis of product development strategies was carried out for both the .GIS web product and WTA to examine the approaches used and to identify whether these approaches were implemented across both products or whether other mechanisms were applied.

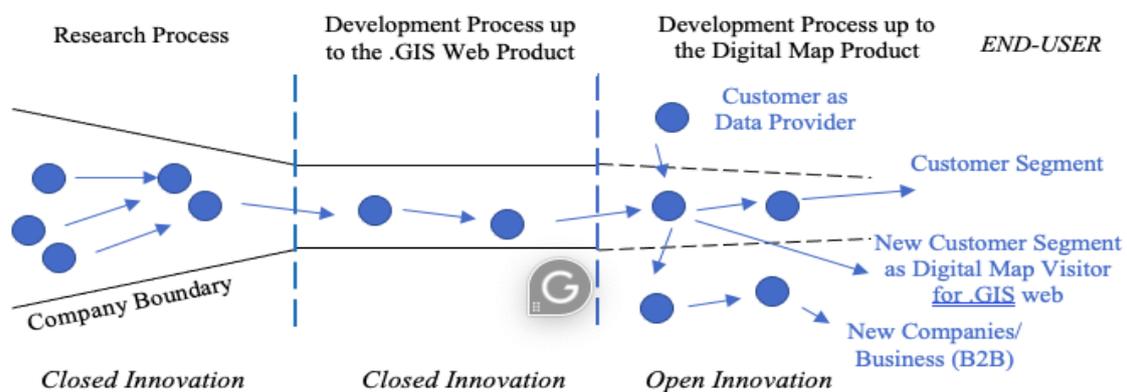
### **3.1 Innovation Process**

The innovation process encompasses the stages of idea creation, idea implementation, and product creation. For the .GIS web product, initial product

research and technology development were carried out internally by the company's team, with the research and development unit acting as the main driver of the process, while the CEO served as the final decision-maker or symbolic partner. The background of the R&D team tends to be relatively homogeneous, consisting mainly of individuals with education in information technology and earth sciences. Based on these conditions, it can be observed that the innovation process of the .GIS web product, from idea creation and idea implementation to product development, was conducted under a Closed Innovation scheme.

However, considering that the product developed is a geospatial technology product with multiple levels of users, not limited solely to end users, the .GIS web product must be equipped with spatial data and attribute data aligned with the intended final use before it can be accessed by end users. The company involves users as determinants of targets, such as themes or types of information to be displayed on the map, as well as providers of the required data. What occurs in the .GIS web product represents a form of User Innovation, where users are able to innovate through the .GIS web product as a form of co-creation within a user-generated content model.

**Figure 1. Illustration of Innovation Process of web .GIS product**



Source: Developed by Author (2022)

For the Weather Targeting Automation (WTA) product, which is still under development in 2022, the development process differs from that of the other products. Technological uncertainty is relatively low, considering that this type of product already exists but has not yet been widely established in Indonesia. The innovation process of WTA tends toward a "probe and learn" approach, in which the company introduces the WTA product to the market gradually, beginning with the release of an initial version for testing purposes. Therefore, market responses to WTA cannot yet be clearly identified, and the form of customer integration in the development process has not yet been defined.

### 3.2 Product Development Strategy

Analisa strategi pengembangan produk dilakukan dengan kerangka Market Pull dan Technology Push baik untuk produk web .GIS dan WTA.

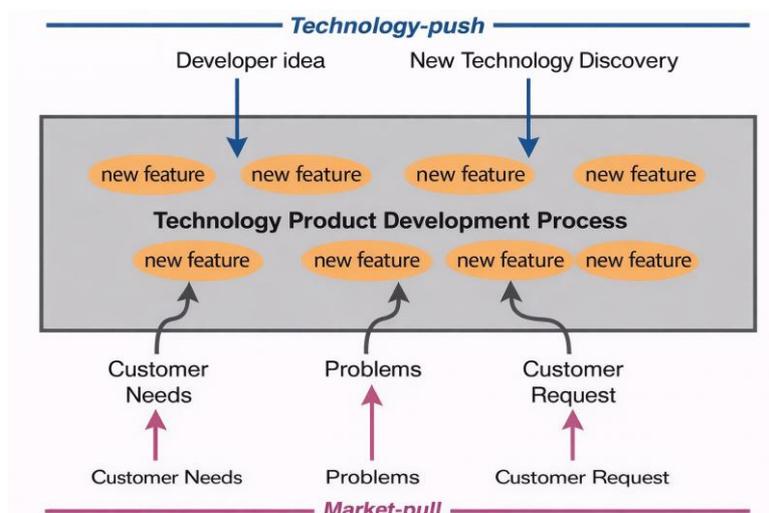
### 3.2.1 web .GIS

The .GIS web product was developed gradually with a market that could be predicted from the outset. The initial idea for the .GIS web technology also emerged from the high demand among government sector clients for web-based digital maps. Initial research was conducted by the internal team, while surveys and interviews were also carried out with potential clients to enrich information regarding the required features of the .GIS web platform. The product development process was implemented using a stage-gate strategy, in which the process is divided into manageable stages every two weeks in order to ultimately achieve the main objectives.

From the customer perspective, the .GIS web product offers different user experiences and interface designs for each client. Therefore, customer responses and feedback are highly considered and used as key references in the development of the .GIS web product. In other words, for the .GIS web product, the company applies a Market Pull approach, and also combined with Technology Push. Authors realize that for tech products, developers can not only rely on market pull or technology push, but both of them. In the .GIS web case, the company started by the request from a client which makes it look like a market pull strategy. However, the creation and development of features are carried out through a technology-push approach, which involves adapting to current technological advancements, seizing opportunities to modify or develop new technologies, and drawing from the ideas of the developers themselves. Without a technology push, there would be neither technological novelty nor added value within a technology product.

**Figure 3. Product Development for Tech Product**

*Factors Affecting the Technology Product Development Process and the Strategies Used*



Source: Developed by Author (2022)

According to the company, the .GIS web product they developed has reached the product-market fit stage, as the product provides tangible benefits to users, both

in terms of technological functionality and as a more affordable option compared to developing a digital mapping website independently. However, given that the earth sciences or geospatial sector is highly niche, the scope of product-market fit is also limited to markets with relevant disciplinary backgrounds.

**Table 1. Interview about Product Development Strategy for web .GIS**

Question	Answer	Fact Condensation
Where did the initial idea for developing Circlegeo's technology products originate?	"Previously, most clients came from government institutions, such as BMKG. They usually requested the development of new interactive web-based services..." ...we then thought, why not transform these project-based works into products."	Observing the need for web-based digital maps, Circlegeo developed the .GIS platform.
How is the technology development planning stage carried out by Circlegeo?	"It starts with initial product research; internally, we identify the challenges faced by users or, for example, determine the purpose of new features..."	Initial research is conducted internally by setting priority scales while continuously exploring customer needs.
How is the concept development stage conducted in the technology creation process at Circlegeo?	"The initial concept remains within the internal team, relying on experience. For technological development, we also involve users."	Concept development is carried out by considering input from customers.

Source: Primary Data from Interview with Product Manager (2022)

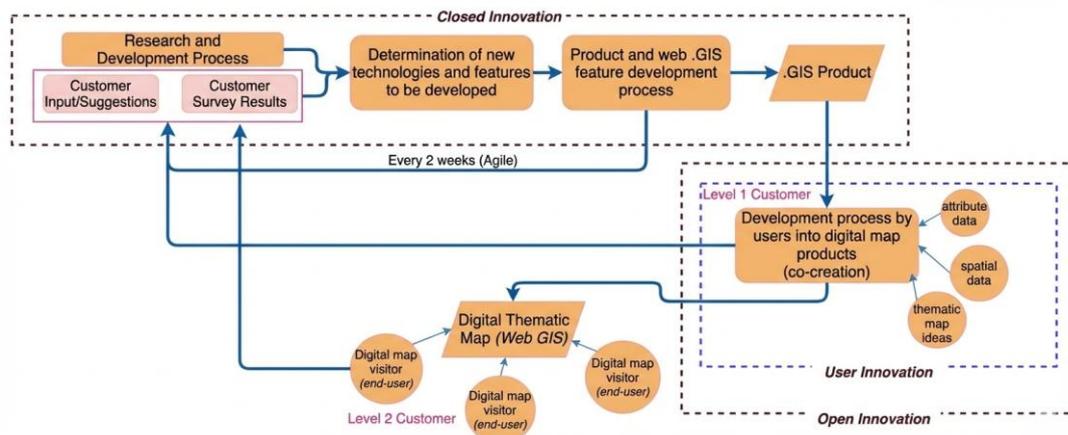
### 3.2.2 Weather Targeting Automation

The company introduced Weather Targeting Automation (WTA) on the grounds that it did not yet exist in Indonesia in 2022, therefore, at that time the company had not been able to identify how the market would respond to this product. The product development process was also carried out independently by the internal team. This indicates that the company applied a Technology Push framework in the development of the WTA product.

#### 4. CONCLUSION

In conclusion, both the Closed Innovation and Open Innovation frameworks can be implemented separately or combined in the development of products or services, as the ultimate objective is to achieve product–market fit or market acceptance. Some products or services may involve external parties in their development, while others may not, depending on factors such as the type of product, marketing strategy, or internal team conditions.

**Figure 2. Illustration of Innovation and Product Development Process of .GIS web**



Source: Developed by Author (2022)

The researcher finds that product development processes, particularly for technology-based products, cannot rely solely on either a market pull or a technology push strategy, but rather require a combination of both. This is evidenced in the .GIS technology, where the initial idea originated from market demand for web-based digital maps. However, the creation and development of features were carried out through a combination of technology push strategies, including adapting to existing technological developments, identifying opportunities to modify or develop new technologies, and incorporating ideas from developers. Without a technology push approach, technological novelty and added value in a technology product would not emerge.

This study is still limited to focusing on two geospatial technology products, whereas there are many other products being developed by companies in this industry. This indicates that future research can be expanded to examine other products or different companies. From a business perspective, small-scale technology ventures inevitably face challenging conditions; however, they can also serve as sources of inspiration, especially when led by young entrepreneurs (Lamine et al., 2015). The advantages of young leaders lie in their time availability, energy, and stronger ability to adapt more quickly to emerging trends (Bohlmann et al., 2017). Therefore, businesses led by young individuals may demonstrate more diverse innovation processes.

## ACKNOWLEDGEMENTS

The research, writing, and/or publication of this paper were not funded in any way by the author or authors.

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