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ANALYSIS OF DISRUPTIVE INNOVATION IMPLEMENTATION STRATEGY

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Abstract: Increased digitization and automation in the construction industry can trigger the emergence of a disruptive innovation phenomenon. Incumbent companies that previously dominated the market may collapse if they are unaware of the disruption phenomenon. Although technology is a key factor in development and innovation, accurate business strategy is needed to manage disruptive innovation so that it can become a new advantage for the company. This study aims to classify PT Pembangunan Perumahan Tbk's disruptive innovation implementation strategy into ideation, incubation, and scaling, and its impact to the company's innovation performance. This study used qualitative research method with case study approach. Data was collected using in-depth interviews with senior manager and senior officer from the Strategic Planning, Research and Technology Division of PTPP and documentation analysis. The result of the research shows that PTPP performs ideation, incubation, and scaling, and able to balance exploration and exploitation in implementing disruptive innovation. The increase in innovation performance based on financial metrics is analyzed from the increase in revenue and profitability. Meanwhile, based on non-financial metrics, innovation performance is measured based on the significance of added value provided by innovation, life cycle improvement, learning organization improvement, and response to dynamic markets.

Keywords: *disruptive innovation, disruption, strategy, construction*

1. Introduction

With automation and digitalization in the era of the industrial revolution 4.0, companies must be adaptive to change by innovating. Implementing a new innovation into a long-standing industry is no easy feat. Innovation is high risk, requires significant investment and is often resisted within the company . But the practice of innovation is needed to be able to identify competitive advantages or maintain the competitiveness that has been previously owned (Seaden *et al.*, 2003)

The construction industry is a sector where innovation is rare (Gambatese & Hallowell, 2011). According to the Gambatese survey, construction companies do not invest much in Research and Development. The construction industry has an innovation level of 30.8%. This figure is quite low and lower than other sectors (Winch, 2003). Whereas in Indonesia, the construction industry contributes 10.75% of Gross Domestic Product (GDP) and its growth rate is 5.76% in 2019 (BPS, 2020). The construction sector tends to use conventional methods in running their business. The innovations carried out are usually limited to the level

of the project being carried out, not at the level of the business as a whole. Winch's survey shows that as other sectors continue to modernize through the introduction of replaceable parts, assembly lines, and automation, construction maintains its manufacturing methods and falls further and further behind other manufacturing industries in terms of productivity and quality.

The lack of innovation in the construction sector and RI 4.0 which demands digitalization in all sectors force the construction sector to innovate. The emphasis on digitizing the construction industry in Indonesia has attracted the attention of the Minister of PUPR, Basuki Hadimuljono (pu.go.id, 2019). According to him, in this era of the Industrial Revolution 4.0, the use of technology in the construction industry must be increased with the hope that the work system used is more efficient and the quality of work results increases, increases the competitiveness of construction products both regionally and globally, the use of technology is expected to add added value in the construction industry, and increasing competence of human resources in the industry.

The emphasis on digitalization and automation in the construction industry can trigger the emergence of a disruptive innovation phenomenon (Christensen *et al.*, 2015). Disruptive innovation occurs when a new business process has the potential to change all conventional ways that are already used. Disruption produces new values that are different from conventional technology. Although at first the performance of this technology is still lower than the old way, this technology can replace and replace the previous technology. Many new technologies replace old technologies or provide only a few minor changes, but disruptive innovation has the potential to cause an entire business transition. The application of disruptive innovation is a new thing in the Indonesian construction world. Research conducted by (Kothman & Faber, 2016) indicates that implementing these innovations could revolutionize the construction market and generate major changes such as individualization with minimum additional costs, shorter time to market, faster and cheaper construction, and freedom of form and integration of functions. But these things can be achieved if the company implements innovation with the right strategy.

According to (O'reilly & Binns, 2019), to achieve success in the face of disruption, companies must master three different stages of discipline, which are ideation, to generate potential new business ideas; incubation, for the validation of such ideas into the marketplace; and scaling, to reallocate the assets and capabilities needed to grow the business. O'Reilly's research shows that mastering just one or two of these stages is not enough. Having new ideas that don't meet the market test, having market tested ideas that can't be scaled up, or scaling ideas that aren't market validated can lead to failure. Success in implementing disruptive innovation requires all three. Therefore , this study will analyze the company's strategies and then classify them into ideation, incubation, and scaling.

The main reason for a company to innovate is the company's desire to improve business performance and competitiveness. With innovation, companies can gain additional competitive advantages and can increase market share, which is something important for companies to build reputation in the market (Gunday *et al.*, 2011). Innovation performance can be defined as the company's ability to transform innovation inputs into outputs, and the ability to transform innovation capabilities and efforts into market implementation. In other words, the definition of innovative performance in a broad sense focuses on the technical aspects of innovation and the introduction of new products to the market (Zizlavsky, 2016).

Therefore, innovation performance will also be analyzed based on financial and non-financial metrics to identify how disruptive innovation can contribute to business transformation, which aims to be innovative, competitive, and remain sustainable.

Because disruptive innovation is a new thing in the Indonesian construction industry, there is a lack of literature related to strategies in dealing with the era of disruptive innovation . This is reinforced by the existence of a future research agenda from previous studies that requires an analysis of how to deal with disruption with ambidexterity (exploitation and exploration) in an industry (Kaulio, Thorén, & Rohrbeck, 2017) and a broader view that established companies can also be successful in dealing with the era of disruption (Sandström, Magnusson, & Jörnmark, 2009). The industry chosen is the construction industry with the consideration that digitalization and automation are new things that are continuously introduced and become the future in the construction industry and this industry has a big challenge to automate because it tends to be conventional (Alaloul *et al.*, 2018). These problem are the background of this research, which is about how to implement disruptive innovation in construction companies. Based on this background, the main research questions can be concluded as:

1. What is the strategy for implementing disruptive innovation in a construction company based on a three-stage analysis of ideation, incubation, and scaling?
2. How is the company's innovation performance with the implementation of the disruptive innovation?

2. Research Method

This research uses qualitative method. The case study was conducted at PT Pembangunan Perumahan Tbk because the company is an Indonesian construction company that has begun to realize the phenomenon of disruption. The choice of approach is based on the need for a broad description and in-depth research of a phenomenon that occurs (R. K. Yin, 2014). Primary data were obtained through interviews with senior manager and senior officer from the Strategic Planning, Research, and Technology Division. In-depth interviews will be conducted to obtain data in the form of disruptive innovation implementation strategies carried out by the company. After that, an analysis will be carried out to classify the strategy into ideation, incubation, and scaling. Interviews were also conducted to obtain information on the company's innovation performance based on non-financial metrics. Secondary data in the form of company financial data will be analyzed to obtain information about innovation performance based on financial metrics. Data analysis will be carried out by compiling and sorting the data, breaking the data into small fragments, regrouping, interpreting the data that has been rearranged, and drawing conclusions from the research conducted (Yin, 2016)

3. Results and Discussion

It takes the right strategy to be able to implement disruptive innovation properly so that it can be added value for the company. The success rate of disruptive innovation implementation can be increased if the company can master three disciplines, namely ideation, incubation, and scaling (O'reilly & Binns, 2019). The following is the result of the classification of disruptive innovation implementation strategies that have been carried out by PTPP into ideation, incubation, and scaling.

Three Stages of Disruptive Innovation

Ideation

The creation of ideas is the first stage in the effort to implement disruptive innovation . This process begins with identifying potential sources of ideas. At PTPP this process is carried out internally and externally.

Internal

1. PP Awards: an internal competition held to assess the innovations that have been made in each project. Innovation is assessed based on the significance that innovation gives to a project. These innovation ideas will later be documented by the company and standardized so that they can then be implemented in all projects undertaken by PTPP.
2. Community of practice: the formation of a community within the company consisting of employees from different divisions with the same passion in the company.
3. Lesson Learned : the creation of ideas based on everyday things that have been experienced, implemented and learned by the company (Knowledge Management)

External

4. Open Innovation: the company conducts research with external parties such as universities (academics), other construction companies, other industries, as well as with regulators (Ministry of PUPR). In addition, PTPP holds a Digital Construction Day every two years to open wider horizons so that it can help the company's digital transformation process . This event is a conference attended by various interested parties in the construction world.
5. Corporate Venture Capital: collaboration with start-up - in the technology field by establishing an incubation container in 2019, namely Apollo. F Okus major collaboration with start-up ad ne of studying technologies that have the potential disruption to the construction industry that can simplify business processes of companies .
6. New technology analysis: regularly analyze new technologies on the Gartner.com website to keep up with emerging technology trends. The technology seen at first may not appear to have any connection with the construction industry. In the next stage, discussions and collaborations with the Appolo team were carried out to see the potential that might be obtained from the development of these technologies for the construction world.
7. Design Thinking: a method of generating ideas by gaining insight into real problems facing consumers and quickly prototyping or potential solutions. This process begins with a hearing phase, which is to understand deeply the problems of consumers, define these problems, then carry out an initial prototype design to overcome these problems.
8. Literature/journal review: The Research and Innovation team also conducts a study of literature or journals to be able to keep abreast of innovation research developments in the construction industry.

The ideation process internally and externally are interrelated and can support each other. If ideation is only carried out by internal parties, there is a possibility that innovation will be trapped in incremental innovation. With the support of open innovation and collaboration with start-up companies , ideas created from internal parties can be developed more broadly or even disruptive ideas can be found and have more potential to provide benefits for the company so that later it can reach a wider market. .

Incubation

After the new ideas are collected, then the ideas are analyzed and sorted based on the feasibility of the idea for further investment. This process is carried out by testing the ideas obtained from the ideation process on the market to obtain a market response. The following is a company strategy that has been classified into the incubation stage :

1. Assessment core technology
   The technologies discussed and selected are rated and assessed for their suitability to the company. Relatedness (connectivity or relationship with one another), Access (who can access the technology), Adaptability (level of technology adaptation with existing/running systems), Bio-interaction (aspects of interaction with living things), and Appropriateness (process relationship inputs and outputs according to the desired context), will be assessed against Material (access to resources, processes, and disposal), Production (resource and pre-product fabrication aspects), Use (usability and implementation aspects), and Infrastructure (system aspects/ supportive environment).
2. Benefit Cost Ratio (BCR)
   Evaluation of the Benefit Cost Ratio (BCR) of the product is carried out which is then included in the assessment matrix, namely the assessment variance technology matrix.
3. Pilot Project
   Includes initial prototyping and initial implementation on a small scale used to prove the viability of the idea . Prototype generated in this phase of the pilot project is Mockup Scale 1:1 or a full-size model of the design or the device so that the consumer can see immediately and try out the products that will be produced later.
4. Data Validation
   Recording the results of prototype trials and feedback provided by customers on the product.
5. User Adjustment
   Adjusting products according to the feedback and comments provided by the customer.

Scaling

In this phase, a stage called Proof of Concept is carried out. The Proof of Concept process consists of several steps, namely: testing product reliability and durability; customer feedback and approval, where the final evaluation of the product is carried out with the user or consumer; and Business Development Scheme or business model development process with new innovation products. At this stage, the top management validation process is carried out in the Ex-Plore Management Review agenda . In addition, consumer education is an important thing that must be done so that consumers are more adaptive to technology so as to increase consumer acceptance of these products.

Company Innovation Performance

The results and benefits from the innovation process is an increase in the company's operational performance both in terms of quantity and quality of work. The company's innovation performance is measured based on financial and non-financial metrics. Non-financial measurements are also important to do because innovation is future-oriented and has the main goal of creating long-term value for the company (Gunday et al., 2011; Zizlavsky,

2016). The following is the company's innovation performance in relation to the implementation of disruptive innovation:

Financial

The company 's innovation performance improves on a financial basis. After the implementation of Disruptive Innovation in 2017, the company recorded operating income from the property and realty segment of Rp.2,750,000,000.00. This amount has increased by 24.7% compared to the previous year's operating income of Rp.2,205,000,000.00. With the growth in operating income, the Company's profit before income tax from the property and realty segment was Rp.468,000,000,000.00, an increase of 24.9% compared to the previous year of Rp.375,000,000,000.00 .

The increase in PTPP's operating income also increased in 2019 compared to 2018 which is described as follows:

Table 1.
PTPP Profitability 2018-2019

Construction Segment Financial Performance	**year of 2019 (Rp-million)**	**year of 2018 (Rp-million)**
External Sales	18.536.809	17.840.228
Sales between Segments	3.307.456	2.525.544
Total revenue	**21.844.265**	**20.365.772**

Sumber : *Annual report* PTPP

Table 4.1 shows the profitability of PT PP in 2018-2019 which shows an increase in the amount of operating income from 2018 which amounted to Rp. 20,365,772,000.00, increasing in 2019 to Rp. 21,844,265,000.00.

Non-financial

There are several measures of innovation performance by the company to measure the success of innovation implementation:

- The innovation can improve the life cycle outcomes of a product in the project.
- Innovation can provide timely alerts, significant information, and analytical insights to make it easier for humans.
- Innovation can increase the dynamic learning of human resources so that they are not only focused as implementers but can increase capacity so that they have the ability to analyze and improve.
- Innovation can respond adaptively to dynamic market changes.
- Innovation can provide real-time forecasts of a construction project.
- Innovation can increase the waste/value ratio of a construction work.
- Innovation to increase knowledge transfer in Knowledge Management . KM focuses on the sustainability of the company and the history that the company goes through because through KM it can be seen the achievements made so far and identify mistakes that have been made so that learning occurs and does not repeat itself in the future.

4. Conclusion

Disruption phenomenon occurs due to digitalization and automation in various sectors. To be able to understand more deeply and anticipate disruptions that could bring down the company, PTPP has a strategy to participate in the disruption phenomenon. Good and mature management of disruptive innovation has the potential to provide added value to the company.

To answer the research question, the strategy for implementing disruptive innovation in construction companies based on an analysis of the three stages of ideation, incubation, and scaling is to analyze the stages of innovation carried out by PTPP and classify them based on O'Reilly's theory. The ideation process carried out by PTPP includes Open Innovation, Corporate Venture Capital (collaboration with start-up companies in Appolo), new technology analysis, literature review, Design Thinking, and Employee Involvement (PP Awards, Community of Practice, Lesson Learned). Then there are several things that are taken by PTPP in incubation, the first is the evaluation process using several assessment matrix, including the core technology assessment matrix and variance technology; early prototypes; and a pilot project which is a prototype trial in an ongoing project. Then in the scaling stage, Proof of Concept is carried out. In this phase, evaluation is carried out with consumers and then validation with top management which is included in the company's agenda, that is Ex-Plore Management Review.

The implementation of disruptive innovation is proven to improve the company's innovation performance. Based on financial metrics, there was an increase in revenue and operating profit. Based on non-financial metrics, there was a significant increase in the added value provided by innovation, life cycle improvement, learning organization improvement, and responsiveness to dynamic markets.

After the analysis, it can be concluded that the strategy undertaken by PTPP in implementing disruptive innovation supports the theory put forward by (O'reilly & Binns, 2019) that there are three stages in the implementation, the ideation, incubation, and scaling. The company be able to balance exploration and exploitation in their innovation stages. The right strategy helps PT Pembangunan Perumahan Tbk to maintain and improve its position as an incumbent company in the construction industry in Indonesia. The strategy is also a way of the company in achieving success in the innovation process it so as to make the output of innovation becomes a significant added value for the company.

There are several limitations in this study. The first research only focuses on the stages of innovation carried out by the company but does not carry out further analysis and identification of changes in business models related to the implementation of the disruptive innovation. Second, interviews were only conducted on two participants. Therefore, future research can do more case studies on the phenomenon and impact of disruptive innovation in the construction industry in Indonesia. Further research can be conducted on construction companies with other business classifications, which are K1, K2, K3, M1, M2, and B1. Disruptive innovation implementation studies for further research can be complemented by analysis of business model changes related to disruptive innovation. Future research is also expected to be carried out with more respondents from strategic division of the company to improve the validity of the data obtained so that the phenomenon of disruptive innovation in the construction industry in Indonesia can be better represented.

Reference

Alaloul, W. S., Liew, M. S., Zawawi, N. A. W. A., & Mohammed, B. S. (2018). Industry Revolution IR 4.0: Future Opportunities and Challenges in Construction Industry. *MATEC Web of Conferences*, *203*, 1–7. https://doi.org/10.1051/matecconf/201820302010

BPS. (2020). *STATISTIK Pertumbuhan Ekonomi Indonesia Triwulan IV-2019*. (17), 1–12.

Christensen, C. M., Raynor, M. E., Rory, M., & McDonald, R. (2015). What is disruptive innovation? *Harvard Business Review*, *93*(12), 44–53. https://doi.org/10.1353/abr.2012.0147

Gambatese, J. A., & Hallowell, M. (2011). Enabling and measuring innovation in the construction industry. *Construction Management and Economics*, *29*(6), 553–567. https://doi.org/10.1080/01446193.2011.570357

Gunday, G., Ulusoy, G., Kilic, K., & Alpkan, L. (2011). Effects of innovation types on firm performance. *International Journal of Production Economics*, *133*(2), 662–676. https://doi.org/10.1016/j.ijpe.2011.05.014

Kaulio, M., Thorén, K., & Rohrbeck, R. (2017). Double ambidexterity: How a Telco incumbent used business-model and technology innovations to successfully respond to three major disruptions. *Creativity and Innovation Management*. https://doi.org/10.1111/caim.12246

Kothman, I., & Faber, N. (2016). How 3D printing technology changes the rules of the game. *Journal of Manufacturing Technology Management*. https://doi.org/10.1108/jmtm-01-2016-0010

O'reilly, C., & Binns, A. J. M. (2019). The three stages of disruptive innovation: Idea generation, incubation, and scaling. *California Management Review*, *61*(3), 49–71. https://doi.org/10.1177/0008125619841878

Sandström, C., Magnusson, M., & Jörnmark, J. (2009). Exploring factors influencing incumbents' response to disruptive innovation. *Creativity and Innovation Management*, *18*(1), 8–15. https://doi.org/10.1111/j.1467-8691.2009.00507.x

Seaden, G., Guolla, M., Doutriaux, J., & Nash, J. (2003). Strategic decisions and innovation in construction firms. *Construction Management and Economics*, *21*(6), 603–612. https://doi.org/10.1080/0144619032000134138

Winch, G. M. (2003). How innovative is construction? Comparing aggregated data on construction innovation and other sectors - A case of apples and pears. *Construction Management and Economics*, *21*(6), 651–654. https://doi.org/10.1080/0144619032000113708

Yin, R. K. (2014). Case study research: Design and methods (5th ed.). In *Thousand Oaks, CA: SAGE Publications*.

Yin, Robert K. (2016). Qualitative Research from Start to Finish Second Edition. In *the Guilford Press*. https://doi.org/10.1007/s13398-014-0173-7.2

Zizlavsky, O. (2016). Innovation performance measurement: Research into Czech business practice. *Economic Research-Ekonomska Istrazivanja* , *29*(1). https://doi.org/10.1080/1331677X.2016.1235983