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Product Development for Sustainable of Garment Product - A literature Review

Suhartini
Department of Industrial and Systems Engineering
Faculty of Industrial Technology and Systems Engineering
Institut Teknologi Sepuluh Nopember Surabaya, Indonesia
suhartini.207010@mhs.its.ac.id

Mokh. Suef
Department of Industrial and Systems Engineering
Faculty of Industrial Technology and Systems Engineering
Institut Teknologi Sepuluh Nopember Surabaya, Indonesia
m_suef@ie.its.ac.id

Udisubakti Ciptomulyono
Department of Industrial and Systems Engineering
Faculty of Industrial Technology and Systems Engineering
Institut Teknologi Sepuluh Nopember Surabaya, Indonesia
udisubakti@ie.its.ac.id

Erwin Widodo
Department of Industrial and Systems Engineering
Faculty of Industrial Technology and Systems Engineering
Institut Teknologi Sepuluh Nopember Surabaya, Indonesia
erwin@ie.its.ac.id

Abstract

The new product development process facilitates consumer needs for new products by considering market opportunities and technology. Consumers want quality products. A systematic product development process can improve product quality. This study aims to explore the process of developing sustainable products in companies. The researcher conducted a literature review of articles taken from Scopus data starting from 2012 to 2021. Researchers used articles from 2010 to 2021. The study used 341 articles. The method used is a bibliometric approach using VOS viewer software. This research creates a matrix of the planning stages in the product development process by considering sustainable aspects. The matrix results show nine research articles discussing the planning stages in the garment product development process by considering all sustainable aspects, eight articles on the economic aspect, and 1 article on the social aspect. Thus, researchers will research to discuss the product development process by considering economic, environmental, and social aspects. The sustainable product development process that is carried out will use the agile concept.

Keywords

Agile, product, sustainable, bibliometrics, garment

1. Introduction

The new product development process is a process that facilitates consumer demand for new products by considering market opportunities and technology (Caniato et al., 2014). Consumers have fast-changing desires, so companies must innovate products. The product development process takes into account the wishes of consumers. Consumers want

quality products. A systematic product development process can improve product quality. Appropriate areas of expertise can contribute to product quality. Meanwhile, research conducted by (Iheanachor, N et al. 2020) states that a product development team with high competence will increase operational efficiency in the product development process. The strategy in the product development process aims to reduce risk, analyze products, and validate products in the product development process.

The new product development process has a deadline. Thus, the product development process is a project. One of the success factors of product development is selecting a project management approach. Some approaches that are often used are the stage-gate model. The stage-gate approach is a linear predictive approach. The linear predictive approach is referred to as the traditional approach. The product development process has traditionally needed to be more effective. This statement is based on research conducted by (Jørgensen, 2019), which states that agile and hybrid approaches significantly exceed traditional approaches in measuring stakeholder satisfaction. Stakeholder satisfaction is critical because stakeholders want product, business, and strategy success.

Thus, to achieve this goal, it is necessary to explore the traditional product development process (Niederman et al., 2018). The research aims to determine the relationship between sustainable business and company performance. According to (Fung et al., 2021), product development planning is classified into two: the conventional product development process and the sustainable product development process. Research on product development processes is carried out in traditional, concurrent, and agile ways. Several studies discuss the hybrid product development process. The product development process that is carried out in a hybrid manner shows a positive influence on producing a successful product development process. The hybrid product development process has been carried out in large-scale companies and SMEs. At the same time, research on developing non-software products with agile concepts is still tiny. Several studies have discussed sustainable products.

Based on the background above, this research needs to help develop sustainable products. This research will discuss garment products. Consumers have fast-changing desires, so companies must be able to meet consumer needs. Companies must respond quickly to consumer needs. Meanwhile, more and more garment products affect increasing environmental impacts. Thus, companies must have a strategy to carry out a sustainable product development process. Strategies in the process of developing sustainable products can improve company performance. Performance can increase the company's profitability.

1. Objectives

Consumers have rapidly changing desires and various products. The product development process aims to fulfill consumer desires. Thus, companies must increase product development. Based on this background, this research has the following objectives:

1. Conduct a literature review on articles that discuss sustainable product development processes. This research uses the Scopus database on sustainable product development processes. From the Scopus database, they will be grouped based on the stages of the product development process and sustainable aspects. Next, the researcher will create a matrix between the stages of the product development process and sustainable aspects (economic, environmental, and social). The matrix is used to find out the topic of discussion in each of these papers.
2. Analyze the literature review results based on the number and topic of research. The research topic discusses the stages of the garment product development process. The stages of the product development process consist of launching, planning, design, and manufacturing. Each stage of the product development process is linked to sustainable aspects. Researchers analyzed the matrix based on the stages of the product development process and sustainable aspects.
3. Determine the research topic based on the results of the literature review analysis. Researchers aim to design further research on the garment product development process. Design research on product development processes can meet consumer needs. Consumer demand is constantly changing, so companies must have various products. Thus, the company must devise a strategy for the garment product development process.

2. Literature Review

Gomes. et al., 2022, stated that sustainable consumers positively influence fashion. Evaluation results are not used to determine strategy but focus on the effectiveness of communication in sustainable implementation. Wang T.W. et al., 2021 stated that sustainable business competencies and capabilities affect company performance. Vatamanescu et al.,

2021 state that there is a relationship between purchasing sustainable products and Corporate Social Responsibility (CSR), CSR Communication strategy, and Corporate reputation. Sarwar. et al., 2021, stated the development of a garment process in a sustainable, cost-effective manner. Performance limitations in developing environmentally friendly products have obstacles in product marketing. Enyoghasi. et al., 2021, stated that 6R-based sustainable manufacturing products, processes, and systems are still limited in using industrial technology 4.0. Yuan W et al., 2021, state that suppliers with expertise in environmental management in product development positively influence performance. Kim et al., 2021, stated that the relationship between products is historical in consumer response to the Circular Fashion System (CFS). research aims to reduce the risk and uncertainty in using CFS. Bruna V. T. et al., 2020 state that the company is developing a collaboration system for stakeholders in the face of ongoing product competition.

Juran K et al., 2020 stated that research on the relationship between parasocial interactions positively affects social strength. Goworek, 2020, researches that increasing clothing longevity can be done by increasing capabilities, knowledge, processes, and infrastructure. If there are obstacles, the company responds quickly. Wang, 2019 stated that sustainability includes aspects of the economy, environment, society, and culture. Perceptions of value and quality are critical in evaluating sustainable performance in the fashion industry. Pedro et al., 2019 stated that a qualitative and quantitative approach would improve product marketing. Stal et al., 2018 used a company strategy with outsourcing by dividing the characteristics of garment products. Macchion et al., 2017 show that Contextual change has a significant relationship between marketing and supply. Hannouf et al., 2017 stated that assessments based on sustainable aspects could be used as recommendations in the development of solving product problems. According to previous literature, Garcia et al., 2017) produced a framework in the form of a fast fashion scorecard to provide interaction information, timeliness, dynamic activities, and offer contributions.

Guo et al., 2017, stated that market demand for green fashion products is increasing, but production levels are decreasing. Pensupa et al., 2017 state that three methods are used to minimize textile industry waste. Koksal et al., 2017 stated that companies are oriented toward sustainable supply chain management. Jung et al., 2016 stated that companies could increase consumer satisfaction and needs. Karaosman et al., 2016 formed a framework for illustrating priority strategies toward sustainability for fashion operations. Bostrom et al., 2016, the company involves all stakeholders to be responsible for the sustainability of the textile and clothing industry. Mair et al., 2016, European textile and clothing users require lower labor costs than Brazil, Russia, India, and China (BRIC). Between 1995 and 2009, carbon emissions decreased in the production of textiles and clothing in Europe. Na et al., 2015 stated that the company has three strategies: environmentally friendly raw materials, reusable clothing, and eco-marketing. Moon et al., 2015, have obstacles in implementing sustainability in the environmental field, namely limited knowledge, few sustainable products and supplies, production and marketing costs, and designs that need to follow sustainable fashion. Alkaya et al., 2013, stated that sustainable products could improve the textile industry in Turkey without having to invest in technology. The textile industry can compete with good quality, low prices, and environmentally friendly production. Shen et al., 2014 stated that companies use sustainable products, raw materials, distribution, and manufacturing processes.

Zurga et al., 2014 has for increasing the use of sustainable raw materials in eco-labeling with a certified standardization system. Kuo et al., 2014, stated that the textile industry measured the effectiveness and performance of green supply chains in environmental aspects by collaborating. Gloria et al., 2014, stated that the company would develop a comprehensive measure of environmental performance in the clothing industry. Cox et al., 2013, stated that customers are aware of the development of new products by considering the social aspects of sustainability. Jorgensen et al., 2012, stated that companies have a strategy for dealing with external factors involving environmental aspects. Gunasekaran et al., 2012 classify supply chain activities based on green manufacturing and service. Green marketing. Subic et al., 2012) stated that sustainable manufacturing uses the Capability Assessment Tool (CAT) to assess suppliers.

The research above discusses the process of developing sustainable products. From this research, the researcher wants to develop further research on product development. The product development topic is the agile sustainable product development process. The research uses the concept of agile in developing sustainable products. The product development process using the agile concept aims to increase efficiency in product development.

3. Methods

This research is a continuation of research discussed by (Fung et al., 2021). The research takes the topic of the product development process. Researchers created a relationship matrix in this study between sustainable products and the new product development process. In this study, researchers examined around 341 articles. The Scopus database uses process, product development, sustainable and agile keywords. Research conducted by (Wang T.W. et al. (2021)) states that a significant relationship exists between agile, sustainable, and operational performance in the supply chain. This study discusses the process of developing sustainable products. The sustainable products used are garment products. Companies use agile methods, including Scrum, Kanban, and Scaled Agile Framework (SAFe). The following Figure 1 shows the flow chart of the article selection process.

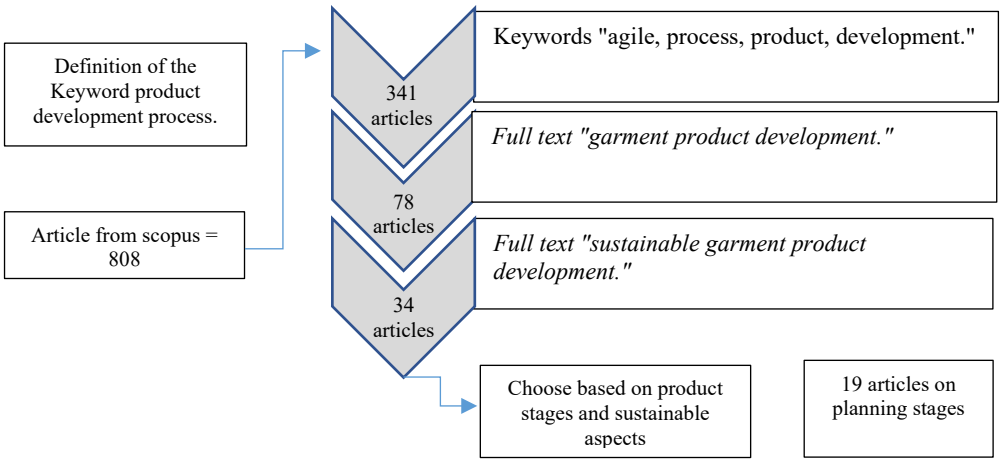

Figure 1. Research flow chart

The picture above shows the steps in carrying out an advanced research design. The first step is determining keywords to search for articles in the Scopus database. Articles used in research must match the keywords. The topic to be discussed is designing sustainable agile product development. At the same time, the object of sustainable product research is garment products. This research uses bibliometric analysis with VOSviewer software. Bibliometric analysis is a quantitative method that describes literature characteristics from journal articles or conference proceedings. The bibliometric analysis aims to determine research topics so that researchers can create research questions. Thus, researchers can answer product development problems by processing articles in the Scopus database using the VOSviewer software. VOSviewer is software for visualizing and analyzing bibliometric data. VOSviewer is a mapping and visualization tool that creates interactive network maps based on bibliographic data. Researchers can find the network map in the article on sustainable product development.

4. Data Collection

4.1 Scopus data based on number and topic

Based on the number of Scopus studies using the keywords "agile, process, product, development," there are 808 articles. The research uses articles from 2010 to 2021. There are 341 articles in total. Figure 2 below shows Scopus data based on the number and research topics.

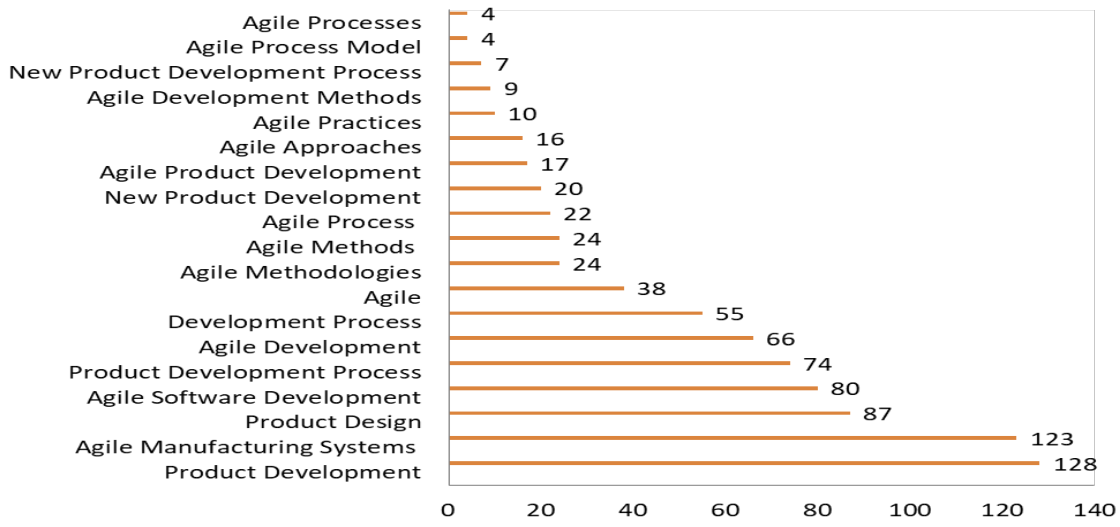

Figure 2. Scopus data by number and topic

The results of the bibliometric analysis show information about the research topic and the number of articles done by previous studies. There has been much discussion on the product development process, but there is still little discussion on the agile product development process. Scopus data shows that the product development topic has 128 articles, while the agile product development topic has 19 articles. Thus, this research will discuss the agile product development process.

4.2 Scopus data based on bibliometrics

From the Scopus data, it can be seen about the topic of the product development process by using bibliometric analysis and VOSviewer software. Researchers use the keywords "agile, process, product, development." Figure 3 shows the network visualization on co-occurrence.

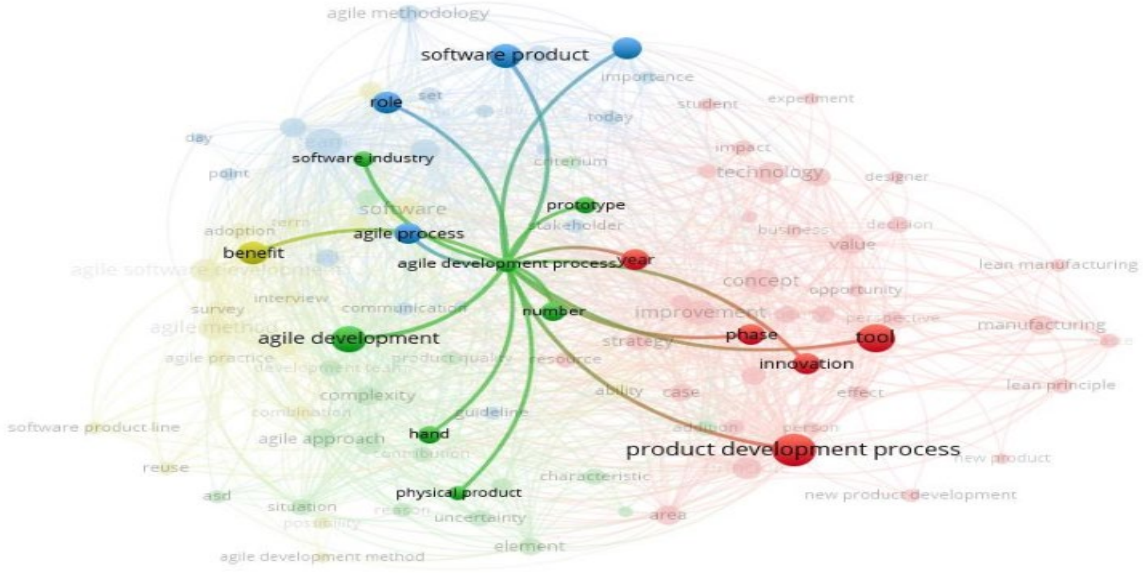

Figure 3 Network visualization co-occurrence

Figure 3 shows the network visualization on co-occurrence which explains the network from one term to another in product development research. The 341 Scopus databases can be grouped into 4 clusters identified based on keywords. The first cluster topic has a red symbol covering product development, tools, phase, year, and innovation. The second

cluster topic with a green color includes the agile deployment process, number, prototype, software industry, hand, physical product, and agile development. The third cluster topic has a yellow symbol, namely benefits. The fourth cluster topic has a blue symbol covering agile process, software, product, and importance.

5. Results and Discussion

5.1 Determination of research keywords

Many previous studies have carried out the topic of the product development process. Fung et al. (2021) have reviewed journals from 1994 – 2018 regarding sustainable product development. Research makes a matrix of product development processes with three sustainable aspects. The research provides recommendations for planning strategies in the product development process by considering three sustainable aspects: economic, environmental, and social. Researchers use articles from 2012 - 2021 about the stages of developing sustainable products. The sustainable products used are garment products.

5.2 Grouping of research articles

This study uses garment products as research objects. The researcher made a matrix about the product development process based on the stages of product development and sustainable aspects. The product development process has four stages: launching, planning, design, and manufacturing. In making the matrix, researchers only use the planning stage by considering economic, environmental, and social aspects. Table 1 below is a matrix between product development planning and sustainability stages.

Table 1 Matrix of the Planning Stages of the Sustainable Product Development Process

<table>
<tr><th rowspan="2">Product Development Process</th><th colspan="3">Sustainable</th></tr>
<tr><th>Economic</th><th>Environmental</th><th>Social</th></tr>
<tr><td rowspan="2">Launching</td><td>Garcia et al., 2017</td><td>Bruna V. T et al., 2020
Naeun K. et al., 2021</td><td rowspan="2">Cox et al., 2013,
Zurga et al., 2014
Juran K, et al., 2020</td></tr>
<tr><td colspan="2">Jung jin et al., 2016
Na et al.,2015</td></tr>
<tr><td rowspan="2">Planning</td><td>Stal et al., 018
Moon et al., 2015
Jergensen et al., 2012
Kuo et al., 2014
Macchion et al., 2017
Hanouf et al., 2017
Shen et al., 2017
Pedro, 2019</td><td>Gloria et al., 2014</td><td>Koksal et al., 2017</td></tr>
<tr><td colspan="3">Wang H, 2019 Moon et al., 2014
Goworek, 2020 Bostrom et al., 2016
Gomes. et al., 2022 Wang. et al., 2021
Sarwar. et al., 2021 Gunasekaran, A., et al.,2012
Karaosman et al.,2016</td></tr>
<tr><td>Design</td><td colspan="2">Yuan W et al., 2021</td><td></td></tr>
<tr><td rowspan="2">Manufacture</td><td>Alkaya, et al.,2014
Subic et al., 2012</td><td>Pensupa et al., 2017
Guo et al., 2017
Vatamanescu et al., 2021</td><td rowspan="2">Mair et al., 2016</td></tr>
<tr><td colspan="2">Enyoghasi et al., 2021</td></tr>
</table>

The table above shows that the topic of the product development process, at the launching stage, discussing economic aspects, has 1 article, environmental aspects have two articles, and social aspects have three articles. In contrast, the launching stage, which discusses economic and environmental aspects, has three articles. The planning stage, which discusses the economic aspect, has eight articles, the environmental aspect has 1 article, and the social aspect has 1 article. While research that discusses the planning stages with sustainable aspects that consider economic, environmental, and social aspects has nine articles. At the design stage, which discusses economic and environmental aspects, it has 1 article. The manufacturing stage, which discusses economic aspects, has two articles, environmental

aspects have three articles, social aspects have 1 article, while those which discuss economic aspects and environmental aspects have 1 article.

5.3 Product Development Process

The results of the matrix show that research discussing the planning stages in the garment product development process by considering all sustainable aspects is found research (Wang, 2019), (Moon et al., 2014), (Goworek G, 2020), (Bostrom et al., 2016), (Gomes et al., 2022), (Wang et al., 2021), (Sarwar. et al., 2021), (Gunasekaran et al., 2012), and (Karaosman et al., 2016). The economic aspect is found in research (Stal et al., 2018), (Moon et al., 2015), (Jorgensen et al., 2012), (Kuo et al., 2014), (Macchion et al., 2017), (Hanouf et al., 2017), (Shen et al. 2017), (Pedro, 2019). The environmental aspect is found in research (Gloria et al., 2014), while the social aspect is found in research (Koksal et al., 2017).

Based on the scope of the discussion carried out by previous research, the research that researchers will carry out is the product development process by considering economic, environmental, and social aspects. The sustainable product development process is carried out with an agile concept. The goal is to accelerate the response to consumer demand for sustainable products. Thus, the company has a strategy to implement an agile sustainable product development process. The product development process uses an agile concept to respond to consumer desires. Companies that have many product ideas can fulfill consumer desires. If the company has many product ideas, the response to consumers can be a short time to make new products. Companies fulfilling consumer desires by responding quickly can increase company profits. Many industries have used the agile concept in developing new products because it can increase profits (Zasa et al., 2021).

6. Conclusion

Scopus data shows that the topic of product development has 128 articles, while the topic of agile product development has a total of 19 articles. Thus, this research will discuss the agile product development process. Topic about the product development process at the planning stage related to sustainability. The topic discusses economic aspects with 8 articles, environmental aspects with 1 article and social aspects with 1 article. While research that discusses the stages of planning with sustainable aspects that consider economic, environmental, social aspects has 9 articles. The research that will be carried out by researchers is the product development process by considering economic, environmental and social aspects. The sustainable product development process is carried out with an agile concept. The goal is to accelerate the response to consumer demand for sustainable products. Thus, the company has a strategy to carry out an agile sustainable product development process. The product development process uses an agile concept so that it can respond to consumer desires. Companies that have many product ideas can fulfill consumer desires. If the company has a number of product ideas, the response to consumers does not require a long time to make new products. Companies fulfilling consumer desires by responding quickly can increase company profits.

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Biographies

Suhartini is a doctoral student at the Department of Systems and Industrial Engineering, Faculty of Industrial Technology and Systems Engineering, Surabaya Sepuluh Nopember Institute of Technology. She is a lecturer in the industrial engineering study program, and industrial technology faculty, at Adhi Tama Institute of Technology, Surabaya.

Dr. Ir. Mokh. Suef, M.Sc. (Eng) is a head lecturer at the Department of Systems and Industrial Engineering, Faculty of Industrial Technology and Systems Engineering, Surabaya Sepuluh Nopember Institute of Technology. His areas of expertise are the Design of Control Charts and Quality Improvement of Machinery Processes. Quality Engineering and Management, Manufacturing Engineering and Management. He is actively conducting research at the Manufacturing System Laboratory.

Prof. Udisubakti Ciptomulyono, M.Eng.Sc., is a professor in the Department of Systems and Industrial Engineering, Faculty of Industrial Technology and Systems Engineering, Surabaya Sepuluh Nopember Institute of Technology. His areas of expertise are Environmental Management, Multicriteria Decision Making, Engineering Management, and Technology Management. He is actively conducting research at the Manufacturing System Laboratory.

Erwin Widodo, S.T., M.Eng., Dr.Eng is a head lecturer at the Department of Systems and Industrial Engineering, Faculty of Industrial Technology and Systems Engineering, Surabaya Sepuluh Nopember Institute of Technology. His areas of expertise are Decision Making, E-Commerce, and Game Theory. He is actively researching at the Quantitative Modeling and Industrial Policy Analysis Laboratory.