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Variations of Business Process Reengineering: The Conceptual Framework for Teak Production Sustainability

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Abstract

For agroforestry industry, in this case teak production, the most challenge that are faced is the balance of teak production optimization and environmental problem. Because, when the production of timber is increased, and then the environment will be affected. Hence, it is required to be found the better solution in balancing the teak production optimization and environment conservation. By searching any literatures, either empirically or theoretically, this article reveals that business process re-engineering that can be implemented by agroforestry industry in teak production may be consist of five stages, they are identifying, model map, analyzing, improvement the process, and re-engineering. All those process must be completed by the principles in the business process they are clarity (understandable), correctness, relevance, economic efficiency, comparability, systematic design. In which must understood and completed in the business process re-engineering may include process mapping, fail-saving, teamwork, and communication. Hence, when it is implemented in the teak production process, it can deliver the positive outcomes that supported the business sustainability in teak production.

Keywords : *Business Process Reengineering, Teak Production, Sustainability*

Abstrak

Tantangan terbesar yang dihadapi dalam industri agroforestri, dalam hal ini produksi jati, adalah keseimbangan optimalisasi produksi jati dan masalah lingkungan. Sebab, ketika produksi kayu meningkat, maka lingkungan akan terpengaruh. Oleh karena itu, perlu dicari solusi yang lebih baik dalam menyeimbangkan optimalisasi produksi jati dan pelestarian lingkungan. Dengan mencari berbagai literatur, baik secara empiris maupun teoretis, artikel ini mengungkapkan bahwa rekayasa ulang proses bisnis yang dapat diterapkan oleh industri agroforestri dalam produksi jati dapat terdiri dari lima tahap, yaitu mengidentifikasi, memetakan model, menganalisis, memperbaiki proses, dan rekayasa ulang. Semua proses tersebut harus dilengkapi dengan prinsip-prinsip dalam proses bisnis yaitu kejelasan (*understandable*), kebenaran, relevansi, efisiensi ekonomi, keterbandingan, desain yang sistematis. Yang harus dipahami dan diselesaikan dalam rekayasa ulang proses bisnis dapat mencakup pemetaan proses, penyelamatan kegagalan, kerja sama tim, dan komunikasi. Sehingga apabila diimplementasikan dalam proses produksi kayu jati dapat memberikan hasil positif yang mendukung keberlangsungan usaha produksi kayu jati.

Kata Kunci: *Rekayasa Proses Bisnis, Produksi Kayu Jati, Keberlanjutan*

INTRODUCTION

Several studies stated that several decades ago, almost the earth was covered by forest.[1] Recently, it is about 31% of the earth is covered by forests in which distributed around the world. The most of it is located in Russian Federation (20,1% or 815 millions hectares), Brazil (12,2% or 497 millions hectares), Canada (8,5% atau 347 millions hectares), United States of America (7,6% atau 310 millions hectares), China (5,4% atau 220 millions hectares), Australia (3,3% or 134 millions hectares), Democratic Republic of the Congo (3,1% or 126 millions hectares), Indonesia (2,3% or 92 millions hectares), Peru (1,8% or 72 millions hectares), India (1,8% or 72 millions hectares), and other countries (33,9% or 1.375 millions hectares). Almost half of them is relatively forest intact, and mo more than one-third (34%) is primary forest.[2]

Forest is a living community consists of associations of trees and vegetation in general and animals that live and interact in complex ways with non-living environmental components such as soil, climate and physiography. Formerly, forest was managed in order to gain timber and other benefits for human need fulfilment. Yet, by the time, forest has more functions for conversion, climate change mitigation and earth stewardship.[3] Forest functions itself may be classified as ecological, economical, social, and aesthethical functions.[4] Therefore, forest may encourage welfare improvement of the community around it.

Beside to the forest functions in which positively encourage community welfare, there are also negative impact of the forest utilization. One most thing is forest degradation in which significantly contibutes to the loss of biodiversity. Since 1990 until 2020, it was about 450 millions hectares of the forest have been loss due to conversion to other usage. It is about 40% of the forest degradation due to commercial agriculture, especially cattle ranching and cultivation oil palm and soya bean; and 33% is for local agriculture. Further, more than 100 million hectares of forests are loss adversely affected by forest fires, pests, diseases, invasive species drought and adverse weather events.[5] Empirically, it was found that the drivers of deforestation and forest degradation are agricultural

[1] Jamal Suliman Alawamy et al., "Detecting and Analyzing Land Use and Land Cover Changes in the Region of Al-Jabal Al-Akhdar, Libya Using Time-Series Landsat Data from 1985 to 2017," *Sustainability* 12, no. 11 (June 2020): 4490, https://doi.org/10.3390/su12114490.
[2] "Making Room for Forests and Food Security," in *The State of the World's Forests 2016* (UN, 2016), 51–85, https://doi.org/10.18356/bc85bbbb-en.
[3] Robin L. Chazdon et al., "When Is a Forest a Forest? Forest Concepts and Definitions in the Era of Forest and Landscape Restoration," *Ambio* 45, no. 5 (September 1, 2016): 538–50, https://doi.org/10.1007/s13280-016-0772-y.
[4] Yosua Damas Sadewo, "Pengantar Ketahanan Sosial, Ekonomi, Dan Ekologi," August 2020, https://doi.org/10.31237/osf.io/ugfj3.
[5] "Making Room for Forests and Food Security."

production, governance, and population growth,[6] infrastructure extension, agriculture expansion (permanent cultivation, shifting cultivation, cattle ranching), and wood extraction.[7, 8]

The deforestation and forest degradation increase environmental problems, such as reducing thermal buffer capacity of forests,[9] carbon reductions, and increase carbon emissions.[10] Other impacts are the microclimatic conditions, hydrological cycle, soil quality, biodiversity.[11] Therefore, it is necessary to improve the forest condition in order the forest can maintain its sustainability for the better world condition. One way that may be taken in encouraging forest in which also remain increasing economically benefits may be by afforestation and reforestation (forestation).[12] In which it is required the sustainable forest management practices that is ecologically, economically and socially sustainable.[13]

One activty that may support sustainable forest management practices is agroforestry industry.[14] The modern agroforestry practices may not only deliver the social and economic benefits, but also ecological advantages. The previous study mentioned that establishing agroforestry industry may be the solution in legal teak supplies and teak forest afforestation, due it provides high quality teak seedlings, develops productive forests and invites its business partners to develop afforestation together with plantation company.[15] Other study stated that agroforestry system that integrating food and trees has the potential to bring economic benefits for rural development and supply plantation wood to

[6] Quy Van Khuc et al., "Drivers of Deforestation and Forest Degradation in Vietnam: An Exploratory Analysis at the National Level," *Forest Policy and Economics* 90 (May 2018): 128–41, https://doi.org/10.1016/j.forpol.2018.02.004.
[7] Yitagesu T. Tegegne et al., "Evolution of Drivers of Deforestation and Forest Degradation in the Congo Basin Forests: Exploring Possible Policy Options to Address Forest Loss," *Land Use Policy* 51 (February 2016): 312–24, https://doi.org/10.1016/j.landusepol.2015.11.024.
[8] Cheng Ling Lim et al., "Untangling the Proximate Causes and Underlying Drivers of Deforestation and Forest Degradation in Myanmar," *Conservation Biology* 31, no. 6 (October 2017): 1362–72, https://doi.org/10.1111/cobi.12984.
[9] Hua Lin et al., "Quantifying Deforestation and Forest Degradation with Thermal Response," *Science of The Total Environment* 607–608 (December 31, 2017): 1286–92, https://doi.org/10.1016/j.scitotenv.2017.07.062.
[10] Jichuan Sheng, "Effect of Uncertainties in Estimated Carbon Reduction from Deforestation and Forest Degradation on Required Incentive Payments in Developing Countries," *Sustainability* 9, no. 9 (September 2017): 1608, https://doi.org/10.3390/su9091608.
[11] Rima Kumari et al., "Deforestation in India: Consequences and Sustainable Solutions," in *Forest Degradation Around the World* (IntechOpen, 2019), https://doi.org/10.5772/intechopen.85804.
[12] Jingfeng Xiao et al., eds., *Afforestation and Reforestation: Drivers, Dynamics, and Impacts* (MDPI - Multidisciplinary Digital Publishing Institute, 2019), https://doi.org/10.3390/books978-3-03921-448-8.
[13] Kumari et al., "Deforestation in India."
[14] Manoj Kumar Jhariya Banerjee Dhiraj Kumar Yadav, Arnab, ed., *Agroforestry and Climate Change: Issues and Challenges* (New York: Apple Academic Press, 2019), https://doi.org/10.1201/9780429057274.
[15] Muhammad Alkaff et al., "Business Process Reengineering of Sustainable Teak Forest at Agroforestry Industry," *International Research Journal of Business Studies* 9, no. 3 (December 2016): 169–83, https://doi.org/10.21632/irjbs.9.3.169-183.

domestic and export markets.[16] However, other literatures shows that there are gaps related to agroforestry industry development, they are the lack of fomal market development, lack of organized information system to help producers production and distribution, determines prices, and promotion (Ham and Thomas 2018),[17] high production expenses, supply chain challenges.

Hence, it is necessary to act more to gain the effective way to increase the agroforestry industry development in order to be able to gain the optimal outcome, either economic, social, and environmental. For this study it will be attempt to find the conceptual model of business process reenginering in optimization sustainable teak production by referring some literatures. Teak (*Tectona grand*) is a high-quality commercial wood which has been developed by the government, farmers and the private sector up to now. Some development areas are part of which is closely related to the traditional lifestyle of the community.[18] Teak production in Indonesia supports the highest income and welfare of farmers and industries, so that it can support development both locally and nationally. The marketing area is very wide, including domestic and foreign. Harvesting in one high cycle of investment strongly supports environmental sustainability, hydrological systems, and local climate.

RESEARCH METHOD

This study applied a qualitative literature review, that is an organized way to research the chosen topic in which presents a logically argued case founded on a comprehensive undersanding of the current state of knowledge about study topic.[19] It consists at least four processes, they are summarizing, analyzing, evaluating, and synthesizing.[20] Hence in this study, researcher analyzed and evaluated both quantitative and qualitative literature within a domain to draw conclusions about the state of the field.

[16] Somvang Phimmavong et al., "Financial Returns from Collaborative Investment Models of Eucalyptus Agroforestry Plantations in Lao PDR," *Land Use Policy* 87 (September 2019): 104060, https://doi.org/10.1016/j.landusepol.2019.104060.

[17] Cori Ham and Wolfgang Thomas, "Pro-Poor Enterprises and the Base-of-the-Pyramid Concept," in *Sustainability Challenges and Solutions at the Base of the Pyramid: Business, T* (Greenleaf Publishing Limited, n.d.), 116–31, https://doi.org/10.9774/gleaf.978-1-909493-77-3_8.

[18] Budi Setiawan et al., "Model of Community Forest Land Management Production and Financial Simulation of Super Teak, Solomon Teak and Sungkai Trees in Samboja Kutai Kartanegara East Kalimantan, Indonesia," *Energy and Environment Research* 9, no. 2 (September 2019): 48, https://doi.org/10.5539/eer.v9n2p48.

[19] Lawrence A. Machi and Brenda T. McEvoy, "Literature Reviews," *Oxford Bibliographies Online Datasets* (Oxford University Press (OUP), October 2016), https://doi.org/10.1093/obo/9780199756810-0169.

[20] Sita Mishra, "Book Review: Anthony J. Onwuegbuzie and Rebecca Frels, Seven Steps to a Comprehensive Literature Review: A Multimodal and Cultural Approach," *Paradigm* 21, no. 1 (June 2017): 106–8, https://doi.org/10.1177/0971890717701780.

FINDINGS AND DISCUSSION

Business Process Reengineering

Business process reengineering is a tool for change in which focuses on re-thinking works frrom ground upwards, eliminates work that is not necessary and considers more effective ways of doing work in order to give value for the customers, either internal or external customers. Business process reengineering redesigns strategic, value added business processes and organizational structures that support them to optimize the workflows and productivity in an organization rapidly and radically. Business process itself reflect the status of any activities in the business in detail and includes the human resources involved it those activities. In which Becker, Rosemann & von Uthman stated that it should fulfill at least six principles, i.e clarity (understandable), correctness, relevance, economic efficiency, comparability, and systematic design (should be adjudted to each other).[21]

Tzortzopoulos stated that business process reengineering have some advantages either for organization entirely, for the process, and the customer. Organizationally, business can obtain competiiveness, consistency through replication, optimize predictability and employees' learning. Related to the rocess, business process reengineering may gain better planning, better communications and timely information exchanges, reducing errors and rework, less time and costs, and benchmark for improvement. Finally, customers may receive product quality, cost effectiveness, and timely delivery.[22] Business process reengineering may also encourage business in the requirements fulfilment for smart manufacturing systems: (1) autonomous operation, (2) sustainable values, and (3) self-optimization.

Some studies applied business process reengineering project model that was composed of three stages: (1) identify the process to be re-engineered; (2) model (map) the processes; and (3) improve the processes. Other study applied four stages for business process reengineering implementation, they are initiation, analyzing, reengineering, and implementation and evaluation.[23] Alkaff et. al implied five stages of business process engineering in improvement of agroforestry industry, they are:[24]

1. Identifying the business process to be re-enginered. This activities was completing by determine the industry that needed to be re-enginered.
2. Model (map) process, was completing by doing current state value stream mapping.

[21] Fouzia Kahloun and Sonia Ayachi Ghannouchi, "Improvement of Quality for Business Process Modeling Driven by Guidelines," *Procedia Computer Science* 126 (2018): 39–48, https://doi.org/10.1016/j.procs.2018.07.207.

[22] Gharib Hashem, "Organizational Enablers of Business Process Reengineering Implementation: An Empirical Study on the Service Sector," *International Journal of Productivity and Performance Management* 69, no. 2 (July 2019): 321–43, https://doi.org/10.1108/ijppm-11-2018-0383.

[23] M'hammed Abdous and Wu He, "IMPLEMENTING AN ENTERPRISE INFORMATION SYSTEM TO REENGINEER AND STREAMLINE ADMINISTRATIVE PROCESSES IN A DISTANCE LEARNING UNIT," *Online Learning* 13, no. 2 (February 2019), https://doi.org/10.24059/olj.v13i2.1664.

[24] Alkaff et al., "Business Process Reengineering of Sustainable Teak Forest at Agroforestry Industry."

3. Analyzing, was completing by waste identification and assesment, and waste analysis.
4. Improvement the process, was done by determining the improvement strategy.
5. Re-engineering, was conducted by determining the future state value stream mapping.

Based on the statemets above, it can be explained that business process reengineering reinvents business processes either structurally or technically to achieve improvements in performance. In which the process of business reengineering may be proceed in the six elements of the business, they are functional structure, value creation, business process, knowledge management, information flows, and data stream. Therefore, factors that influence the implementation of business process reengineering may be: management commitment, IT infrastructure, people management, change readiness, and organizational structure with a low degree of formalization.[25]

Sustainability Concept

Sustainability began emerging since 1980s which due to the environmental condition that require preservation as the impact of natural resources, especially unrenewable natural resources of past years. The World Commission on Environment and Development defined business sustainability as fulfillment of current needs without sacrifying the ability of the next generation to meet their needs. The term sustainability in business refers to the company's ability to maintain the company's operations so that it can survive in the future through the achievement of economic performance, which in turn will be able to achieve a good corporate financial position (profitability, liquidity and solvency), and strong relationships between companies with stakeholders, such as customers, suppliers and competitors.

Sustainability in the academic and practice may be defined as environment preservation to create a better environment for generations to come. Whereas in the financial context, sustainability is considered as an emphasis on financial performance that is able to generate value for shareholders, both in the long, medium and short term, in which there are three pillars of sustainability, they are economic/financial, social commitment, and environmental commitment.[26]

The International Federation of Accountants (IFAC) stated that global business organizations are expected to take responsibility at a broader level on sustainability issues, such as environmental and social issues which will simultaneously influence the company's financial performance and the company's ability to create value over time. Thus, business sustainability as a process of emphasis on achieving the dimensions of sustainable performance may consist of five dimensions, namely economic, governance, social, ethical,

[25] Hashem, "Organizational Enablers of Business Process Reengineering Implementation: An Empirical Study on the Service Sector."
[26] Jijun Gao and Pratima Bansal, "Instrumental and Integrative Logics in Business Sustainability," *Journal of Business Ethics* 112, no. 2 (February 2012): 241–55, https://doi.org/10.1007/s10551-012-1245-2.

and environmental (EGSEE). Economically, the company should focus on activities that produce long-term profitability and not just short-term performance; effectiveness and efficiency improvement efforts on production process; communicating the sustainability performance to stakeholders; customer satisfactions; innovation; and taent management.

Governance dimension can be explained that the company must increase the accountabillity, sustainable operational performance, sustainable financial performance, information reliability and quality improvement, and integrity enforcement. The social dimension reflects the transformation of social goals in the company practices which deliver stakeholders' wealth. This dimension can by the level of customer satisfaction, social mission, product good and service) quality, and employee welfare. Ethics dimension is represented by the codes of conduct, accountability system, and conducive work environment. Finally, environment dimension including activities such as creating the better work environment, carbon decreasing, air and water quality improvement, and maximize the positive impact of company's activities on natural resources and environment. For those, factors that influence business sustainability are internal and eksternal factors. Empirically, factors that influence sustainability are strategic planning, leadership, business value, and governance.

Business Process Reengineering and Sustainability in Teak Production

Sustained wood production and biodiversity conservation are two key objectives of sustainable forest management policy.[27] Yet, the problem is both need to be balanced in order that the sustainable wood production can be gained. Hence, it is needed to improve the processes to carry out positive changes that will increase the process performance.[28]

[27] Vladimir Naumov et al., "How to Reconcile Wood Production and Biodiversity Conservation? The Pan-European Boreal Forest History Gradient as an 'Experiment,'" *Journal of Environmental Management* 218 (July 2018): 1–13, https://doi.org/10.1016/j.jenvman.2018.03.095.

[28] Andrea Sujová and Katarína Marcineková, "Improvement of Business Processes – A Research Study in Wood-Processing Companies of Slovakia," *Procedia Economics and Finance* 34 (2015): 296–302, https://doi.org/10.1016/s2212-5671(15)01633-0.

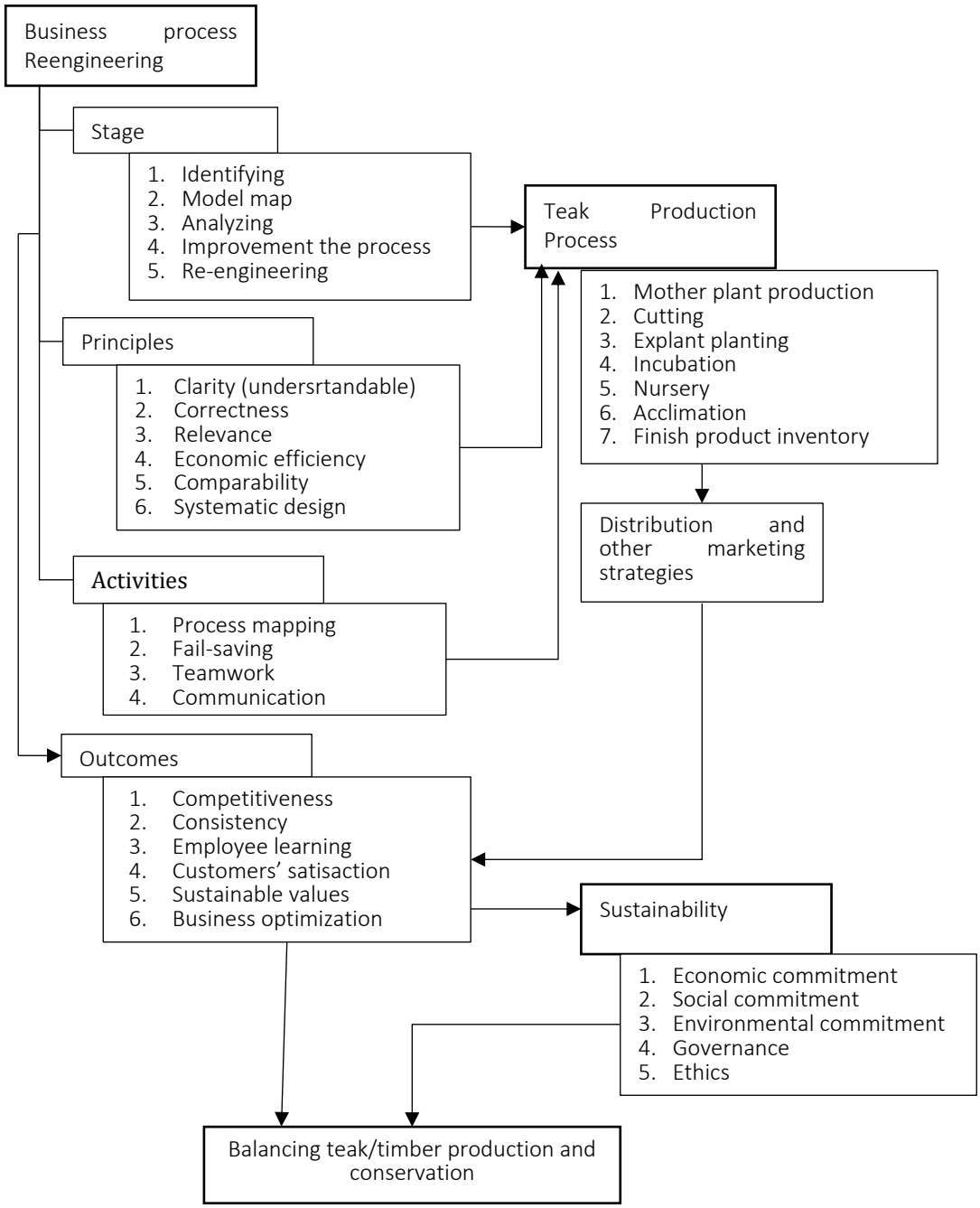

Figure 1. Business Process Re-engineering Practice for Teak Production Sustainability

Teak production may be consists of several process i.e mother plant production, cutting, explant planting, incubation, nursery, acclimation, finish product inventory. For those process, the business process reengineering efforts which may improve the system include improvement of the storage capacity for storing raw materials that have relatively short storage life by installing additional freezers, provision of independent planting media processing facilities, provision of specially designed trays for explants planting, incubation and nursery processes, replacement of the planting media removal technique with the new effective one, use of trays to remove the seedlings into polyethylene

bags to ensure an easy removal of plants, particularly the removal that not require planting media replacement, and use of handlift to move group of plant seedlings in order to reduce defects and to speed up the removal process. Other study also stated that the sustainable process in wood production may be improved by development transpport infrastructure.[29]

Study by Rauch and Borz revealed that in reengineering the business process, particularly inter-organizational processes are offer great saving potentials, mainly due to the existing multi-level hierarchy and multi-level control obligations. By introducing a web-based platform to enhance a collaborative workflow can considerably decrease the time needed for providing harvest sites or logs to customers via auctions.[30]

Based on the explanation above relates to business process and sustainability concept, it can be explained that teak production and conservation are interrelated factors. Where if it is not managed properly, there will be a negative relationship between the both of them. Through the business process re-engineering carried out by the agroforestry industry, it is expected to be able to conduct analysis and improvement of business processes that have been carried out so that business outcomes can be achieved, such as, competitiveness, consistency, employee learning, customers' satisaction, sustainable values, and business optimization that puts forward the concept of business sustainability. In which, finally it will bring the business into teak production and conservation in balance.

Business process re-engineering that can be implemented by agroforestry industry in teak production may be consist of five stages, they are identifying, model map, analyzing, improvement the process, and re-engineering. *Identifying* is the stage in which the company develops a customer-oriented business model and identifies value-added strategy processes, and maps the organization, resources and volume for specific processes and priorities, and recommends specific processes as a result of the highest reengineering targets. The management techniques used are the customer model, performance measurement and cycle time analysis, process models, integration of suppliers and cooperation programs, workflow analysis, organizational maps, cost analysis based on activities, change management and facilitation.

Model map is the stage in which the company do value stream mapping that is the activities to determine the flow of material and information in designing, ordering, and establishing a product or value. By this model mapping, it may be detected the value and non-value activities. Analyzing is the process analysis in which may be completed to identify factors that cause the waste such as defect product, idle time, etc. This may be conducted by analysing seven waste concept, i.e. over production, defect (reject), unnecessary inventory,

[29] Naumov et al., "How to Reconcile Wood Production and Biodiversity Conservation? The Pan-European Boreal Forest History Gradient as an 'Experiment.'"

[30] Peter Rauch and Stelian Alexandru Borz, "Reengineering the Romanian Timber Supply Chain from a Process Management Perspective," *Croatian Journal of Forest Engineering* 41, no. 1 (November 2019): 85–94, https://doi.org/10.5552/crojfe.2020.610.

inappropriate processing, excessive transportation, waiting/idle and unnecessary motion.

Improvement is the stage to determine the improvement strategy. It may include the technical dimensions of the new process which will produce a description of technology, standard procedures, systems and controls for employees, the design of interaction of social elements and techniques, preparation of plans for development, acquisition, facilities, testing, conversion and dissemination. The management techniques used are workflow analysis, mechanical engineering information, work measurement, strategic automation, change management, project management and facilitation. Re-engineering is the implementation of the new bosiness process to realize the vision of the reengineering process. It is the final stage for implementing the planning process and may be represented by the future value stream mapping. The management techniques used are process models, mechanical engineering information, expertise references, group building, continuous improvement, performance measurement, change management, project management and facilitation.

All those process must be completed by the principles in the business process they are clarity (undersrtandable), correctness, relevance, economic efficiency, comparability, systematic design. In which must understood and completed in the business process re-engineering may include process mapping, fail-saving, teamwork, and communication. Hence, when it is implemented in the teak production, it can deliver the positive outcomes tnat supported the business susainability in teak production.

CONCLUSION

Mostly, in production processes are found the process barriers and work units that out of control. As a result, the costs and cycle times are bad and affect the low production capacity. For agroforestry industry, in this case teak production, the most challenge that are faced is the balance of teak production optimization and environmental problem. Because, when the production of timber is increased, and then the environment will be affected. Hence, it is required to be found the better solution in balancing the teak production optimization and enviroment conservation.

Business process reengineering refers the radical and fundamental business process redesign, that proposed to gain the value for creating customer satisfactions, business performance, and competitiveness. This business process re-engineering, when it impelemnted by the sustainability requirements for teak productions, then it will delicer the social, economic, and environmental benefits. In which may be balancing the problem that commonly raised between teak production and nature conservation. Therefore, eventhough, business process reengineering commonly is focused on reducing costs and cycle times so that there is an increase in the quality and quantity of production, yet it also must consider the socio-cultural and environmental factors in order to gain the sustainability for industry. By the business process reengineering, the business

may obtain a new production process that is better or more in line with the goals of the company or organization.

Business process re-engineering that can be implemented by agroforestry industry in teak production may be consist of five stages, they are identifying, model map, analyzing, improvement the process, and re-engineering. All those process must be completed by the principles in the business process they are clarity (undersrtandable), correctness, relevance, economic efficiency, comparability, systematic design. In which must understood and completed in the business process re-engineering may include process mapping, fail-saving, teamwork, and communication. Hence, when it is implemented in the teak production process, it can deliver the positive outcomes tnat supported the business susainability in teak production.

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