

Towards Economic Degrowth for a Sustainable *Palay* Supply in the Philippines

Mildred M. Juan

The Graduate School, University of Santo Tomas, Manila,
Philippines

Ronaldo R. Cabauatan

The Graduate School, College of Commerce of Business Administration, and Research
Center for Social Sciences and Education, University of Santo Tomas, Manila, Philippines

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ABSTRACT

In this age of Industrial Revolution 4.0, countries prioritize economic growth, like the increase in Gross Domestic Product. The study investigates the relationship of Gross Regional Domestic Product (GRDP), household final consumption expenditure (HFCE), and *Palay* production in 15 regions in the Philippines over the period 2009 to 2018. Results show that household final consumption expenditure is insignificant on *Palay* production and that GRDP has a positive effect on *Palay* production using Fixed Effects (FE) and Random Effects (RE) Panel Least Squares (PLS) regression. The Hausman test shows that the preferred model is the Random Effects model. The results show that degrowth is not necessary for the 15 regions to achieve sustainable *palay* production or to ease consumption so as to maintain a steady supply of *palay* in the Philippines.

Keywords: Degrowth, steady-state, *Palay*, Gross Regional Domestic Product (GRDP), Household final consumption expenditure (HFCE).

1. INTRODUCTION

There are many challenges and struggles that people encounter in the world today. These challenges can be economic, social, or environmental. While the rate of the population keeps increasing, the Earth's natural resources are continuously depleting since the inevitable need for more food, clothing, and shelter persistently prevails. According to the United Nations (2012), the global population exceeded by 7 billion last 2011 and is expected to increase to 8 billion by 2025. As a result, this population growth will undoubtedly cause an increase in consumption and demand for renewable resources. Thus, excessive consumption and production may adversely bring pollution and global warming into the environment (Ianole & Cornescu, 2013). This situation roots from how people tend to abuse and overuse natural resources, thinking that it is unlimited. Lately, companies begin mass production to cater to the needs of more people, but these products are less likely to be consumed. The UN reported that humankind produces 1.3 billion tons of food waste each year, which causes economic losses of 750 billion dollars and perilous damage to the environment (UN, 2013). The scale of a country's development is perceived through the rate of its GDP. According to Global Peo Services (2020), highest GDP in 2020 was the United States, followed by China and then Japan. These countries topped the list for the following reasons: innovation, highly qualified workforce, good economic policies, hard work, and advanced research facilities. But besides growth and development and the macroeconomic performance of an economy, a broader measure of income and saving regulation for pollution, depreciation, and depletion of resources, should also be considered (WB, 2019). The current economic indicators from the

World Development Indicators (WDI) track progress toward Sustainable Development Goals (SDG), specifically Goals 8 and 2; SDGs 8 and 2 focused on promoting decent work and economic growth and encouraging sustainable consumption and production, respectively (WDI, 2019).

As more calamities hit the countries around the world, and a global pandemic affected millions, people are becoming more aware that the world is not safe because of their actions. A study made by Delis and Iosifidi (2019) proves that environmental awareness improves environmental quality by decreasing polluting units. Overconsumption and overproduction are being acknowledged as problems by a rising population, and a call for prosperity without development, or even degrowth has intensified (Akbulut, 2019). This study sought the possibility of degrowth in the Philippines or in particular regions to have enough supply of *palay* to satisfy the needs of the Filipino people. This study estimated the relationship between GRDP and *Palay* production per region. This research was estimated to recognize if the income per region affects the production of *palay* per region. Also, the researcher estimated the relationship of Household Final Consumption Expenditure per region and the *Palay* production per region. This study is to determine if there is overconsumption and underproduction. The GRDP was also estimated to see its relationship to the Household Final Consumption Expenditure per region.

2. REVIEW OF THE LITERATURE

A Focus on Well-being and Balance of work and rest

Well-being can be subjective, that is, happiness and life satisfaction, which is based on eudaimonia or the best conditions of a good life, depends on every person (Buchs & Koch, 2019). Life satisfaction and happiness are not only caused by a good standard of living. Neither, a good life will come from a material fortune. According to Bucks and Koch (2019), initially, in the US, the higher the income, the higher the level of happiness. But at the national level, as the country's GDP increased in the long run, the total happiness scores did not increase. Hence, this situation illustrates that it is not in a person's income that brings happiness to people. One dimension proposed in the Second International Convention on Degrowth held last 2010 was about the "time dimension." This sector talks about the concept of work, division of labor, and how to spend one's free time. The degrowth movement gives special attention to work sharing (Palminhas, 2015). For Krall (2015), growth makes them work too much that their significant effort does not create any meaning. The Universal Basic Income is one specific alternative for degrowth. Income without work requirement shows a positive correlation with the happiness of the workforce. For Roosma and Oorschot (2020), in the European Union, the positive reason for a basic income is the reduction of anxiety about thinking of satisfying their basic needs. Thus, this data shows that many people believe that basic income can support society in their everyday life.

According to Graves (2017), there are two predominant cases cited for employees receiving salary and workers receiving an hourly wage, in situations where one cannot easily vary leisure. If one person wishes to work more hours but cannot be rewarded for that, the willingness to pay for global climate stability would come primarily out of their private consumption. But if an individual wanted to work less than the workplace requirements, the marginal value of "ordinary personal goods" can be lower compared to the "climate public goods." The willingness to pay for the "climate public goods" would come increasingly from the decline of such "ordinary private goods." That is because a person's willingness to pay

comes from the decrease in ordinary private goods rather than leisure. The study concluded that the greater the government's investment in reducing greenhouse gas emissions, the more public benefits, thus making it worth it. Ubeda et al. (2019) validated that the contribution of human resource organizations is impeccably significant in making environmental improvements in management: giving trainings, rewards, and other development opportunities will motivate the employees to practice a more proactive and sustainable working environment. This satisfaction will make the workforce more productive and happier, which, in turn, will contribute to a better society. Degrowth emerged as a paradigm that emphasizes that there is a contradiction between sustainability and economic growth. Degrowth originally was placed at the junction of ecological and cultural critiques to economic growth and development but has recently revolved around the concerns on democracy, justice, and the meaning of life (Asara et al., 2015). "Socially sustainable" often accompanied the term degrowth. Hence, it can also be related to the development of social well-being and equity. This principal sustainability can be seriously taken by prioritizing the ecology instead of focusing on economic growth.

Aiming for a Socio-ecological Sustainability

Natural resources are a primary source of raw materials in producing a product. Farmers and fisher folks are but a few whose livelihood needs natural resources. A choice experiment done by Le Coent, Preget, and Thoyer (2017), showed a study where farmers were made to choose between a conservation contract and a compensation contract. In the result taken, it appeared that most organic farmers prefer conservation contracts. This upshot means that they are willing to accept pay lower than their literal cost of compliance just so that they can conserve the resources they utilize in making a living. The SDGs were determined at the UN Conference on Sustainable Development in Rio de Janeiro in 2012. The objective of this was to produce a set of universal goals that addressed the urgent environmental, political, and economic challenges facing the world (UNDP, 2020). According to Palminhas (2015), sustainable development can be divided into four dimensions namely: social, economic, environmental, and institutional. He claimed that these sectors must be taken holistically and should unite the environment and development.

Humanity uses about 40% more resources in one year, a lot more means than nature can regenerate within a year (Lorek & Fuchs, 2011). Daly (2018) cited that humanity wants to maintain and enjoy life, even at the cost of depleting and polluting the environment. This case is such a critical problem, especially if the world will continue to be dominated by materialism. There is one study about Green bonds for the Paris agreement (Tolliver et al., 2019), which sets environmental finance instruments conducive for SDGs and Nationally Determined Contributions (NDC). The findings showed that even though energy and greenhouse gas-related measurements are provided, there are remaining policies lacking water and wastewater systems, recycling, ecosystem preservation, sustainable forest management, and other aspects of the SDGs and climate change adaptation. The study concluded that the proceeds allocation trend of these green bonds was not sufficient in addressing the global investment challenges. Sandberg et al. (2018) stated that the normative ideal of environmental sustainability entails preserving not only the survival of both the natural environment, but also the future of human society. The study identifies green growth as the dominant anticipatory-utopian vision on how to achieve environmental sustainability. Green growth has been suggested as a solution for environmental degradation. Degrowth, on the other hand, is a more radical approach to green growth and is defined as the socially sustainable process of downscaling society's metabolism and output. Socially sustainable

degrowth was the title used to distinguish between the forms of desirable degrowth that enhance environmental sustainability, human well-being, and social equity from that of unsustainable degrowth of crisis. The article suggests that degrowth shows more efficiency than green growth as a solution to environmental degradation. Suki et al. (2020) examined the impact of globalization on ecological deterioration in the context of the Malaysian economy and assesses the long-term quantile effect of globalization, including economic, social, political, and total globalization, on ecological footprints in Malaysia. The findings implied that as economic progress and globalization continue to grow in Malaysia, the environmental condition of the country will further deteriorate. One recommendation in dealing with this situation is how the government can initiate measures to attract higher participation in economic processes such as reducing or eliminating trade barriers. This action may more likely improve regional integration and boost business and consumer confidence.

Advocacy of economic growth in some of the most influential policy documents on sustainability and biodiversity is analyzed by Otero et al. (2020). The study concluded that economic growth and biodiversity loss are related via a set of mechanisms triggered by increased resource use. In contrast, the global biodiversity and sustainability policies generally advocate economic growth and have unclear positions regarding its effects on the environment. In the study of Ubeda, et al. (2019), the degrowth movement has proposed the attainment of self-sufficient, and environmentally respectful companies with sufficient potentials to guarantee the well-being of all citizens utilizing locally available resources. According to the study, new social and sustainable practices must be innovated and replace the current management system. Another study focused on the impact of voluntary degrowth policies by Gemain (2017), which distinguished three types of externalities linked to the exploitation of natural resources, pollution, and production, which also noted by Chaichan and Maneenate (2017). Given that resources are limited, it is mentioned that infinite growth is impossible and, the economy can at best converge to a stationary equilibrium. Continuous growth will, in the long run, cause a decrease in welfare. This welfare decrease motivates the public authorities' intervention and the implementation of a degrowth policy whose instrument is a tax levied on the exploitation of the natural resource. The article studied the implementation of sustainable degrowth policies in a decentralized economy with a sustainability criterion that states that social welfare should not be decreasing over time.

There are alternative short food supply chains that give a chance to people to get control over the food systems and their resources by generating proximity among actors. That enhances social interaction and reduces ecological impact. According to Santos (2017), social currencies are innovative monetary mechanisms that create a parallel mode of value by allowing people to offer and purchase goods. There were several contributions of social currencies cited in the following: economic sustainability, environmental sustainability, and social sustainability. One contribution under economic sustainability is, it offers a supplementary means to access goods and services for those who might otherwise be financially excluded or unable to find work. On the other hand, some advantages of social currencies in environmental sustainability are more localized consumption patterns. It facilitates resource-sharing and pro-environmental actions like rewarding those who participate in recycling programs. Social sustainability allows people to meet their psychological needs through social action. This short food supply chain can highly promote sustainability, but further analysis of this system was recommended in the cases of developing and developed countries.

Towards Sustainable Production and Consumption

According to Gerber et al. (2020), the systems of production and consumption have been the object of major critiques like Marxism, anarchism, post-developmentalism, and degrowth. The author discussed and explained common misunderstandings on degrowth. First, it is not just reversing GDP, but degrowth is not to have less of the same things but to organize opportunity, extraction, production, distribution, consumption, and waste differently. Second, degrowth is not imposing austerity everywhere and minimizing everything. Some goods like local products will be consumed and produced more in a degrowth society. Also, other economic activities like agro-ecology and urban gardening will likewise flourish with degrowth. Third, degrowth is not anti-technology. It is giving the consumers a prerogative to decide if they will patronize goods that are eco-friendly or not. Fourth, it is not about pursuing only the local products, but degrowth believes that global products should be distributed equally and not just for those who can afford them. Fifth, degrowth is not soluble in capitalism. It is post-capitalist in nature that promotes new ways of producing goods. Lastly, it is not anti-Marxist, but it is against certain beliefs like the blind faith in technology. The study presented four agrarian economists and suggested that Critical Agrarian Studies (CAS) would succeed if it would take ecological relations as seriously as social relations. This way, it will help CAS and degrowth become closer to one another.

Palminhas (2015) stated that "Strong Sustainable Consumption" (SSC) can provide capable scrutiny of the connections between consumption and sustainable development that can successfully contribute to degrowth. For the SSC approach, a change in consumption levels and patterns is necessary to achieve sustainable consumption. It highlights the need to lessen overall consumption instead of focusing on product-based individual consumption. Degrowth supporters endorse a downscaling of consumption and production, which is a contraction of economies when using measurements like GDP. Degrowth considers several dimensions like time, availability of resources, poor infrastructure, finances, and institutions with the socio-economic organization. Inequity and social comparison, material needs, and consumer imagination must also be analyzed in this situation. The argument is that overconsumption is the way to long-term environmental and social inequality. According to Felipe and McCombie (2017), the East Asian economies had achieved growth rates in the past three decades that led to the upscale of the living standards of their population. But rapid growth will eventually have stagnation due to diminishing returns. The neoclassical production theory should be stated in physical terms - production function has a technical relationship among physical quantities. But the researchers, however, used value data because firms do not publish visible quantity data, and the implications thereof have been missed. The problem with the method used is not the low TFP growth rates estimated, but because of an underlying accounting identity in constant-price value terms - which is related to the same variables that appear in the production function. Another concern is that aggregate TFP is not a measure of productivity. Therefore, the growth literature has to move beyond the framework of the neoclassical model, and the TFP research program has to analyze how economies grow. According to Jellil et al. (2018), Consumer Food Waste (CFW) is one major problem in production and consumption because it is associated with environmental and economic impacts. Researchers observed that CFW is a consequence of how consumers purchase, store, cook and consume food. Furthermore, CFW is more than a behavior issue - it is a symptom of a bigger societal problem shaped by an unsustainable production and consumption system that relies on oversupply, consumerism, and competition on reduced prices. The research used the Product Service System (PSS), which provided access information that better explained consumer behavior. The PSS also increased consumers' awareness regarding the environmental impact of their purchase and consumption behavior,

resulting in minimized food waste. Steinhubel et al. (2020) analyzed the adoption of borewell technology in agriculture production in South India. Even though today, India is the biggest user of groundwater globally, this development is said to be spatially concentrated, where large areas remain under rainfed agriculture. This circumstance indicates that there are local differences in adoption rates. One of the main reasons for adopting groundwater lifting technology is to protect against production risks. One of the crucial production risks in agriculture is adverse climate, drought, water scarcity, and increased volatility in weather events. Therefore, agricultural produce is essential for the livelihood of the farmers. Hence, productivity in agriculture must be improved. The results of this study show that household location also matters. Dry periods accelerate the adoption of borewell technology, and the adoption rate also depends on every household's additional income.

Yao et al. (2019) led the effects of human capital on energy consumption for a panel of OECD countries from 1964 to 2014. After distinguishing between clean and dirty energy consumption, the findings were: human capital is associated with a 17.33% decrease in dirty energy consumption, and there was an 85.54% increase in clean energy consumption. The study also found that through income, technology, and input, the difference between human capital and energy consumption can be resolved. Households with higher human capital consume less energy since they choose to use appliances that are energy efficient. There is an article giving attention to the environment about supply chain management and this is called sustainable supply chain management (SSCM) by Govindan (2017). The main challenge lies in integrating two concepts: sustainability and supply chain management. To achieve SSCM, Sustainable Consumption and Production (SCP) was suggested. According to the study, food loss and waste are two of the most striking problems concerning consumption and production and should be solved immediately. Since the world has limited resources, sustainable patterns in consumption and production are required to achieve sustainable development. Sustainable production can contribute to green, inclusive, and decent employment standards. The reason for this is, sustainable agricultural systems are more labor-intensive, and they avoid toxic or polluting chemicals. Since food consumption and production trends and patterns can affect the environment, changes in food production, processing, transportation, and consumption, have to be analyzed and reviewed to give way to sustainable development. D'Amato et al. (2018) studied the forest-based circular bio-economy business models in Finnish, and, in pursuing SDGs, the study stated that innovations and changes in the current economic model and production-consumption systems should be applied, with the private sector playing a significant role in this process. The circular economy focused on improving the efficiency and recycling capacity of the current consumption-production system through input reductions, eco-design, improved practices, and waste reuse. The study identified that several companies utilize innovative technological development, but the advantage is its compatibility with existing production or processing facilities. Several managers also mentioned that this new combination of resources and technology results in a cleaner and safer production processes compared to the existing alternatives. For example, wood-based fiber does not require the same high temperatures or chemicals as fossil-based raw materials. It was recommended that the sustainability practices are not enough in the long run to achieve changes necessary for social and environmental sustainability.

In a study by Chakraborty et al. (2016), food consumption trends worldwide have significantly changed in the last decades as the consumption of animal products tripled in developing countries since 1963. Recently, consumption was seen as a social practice theory approach that focuses on everyday collective routines and habits. Food consumption as a

practice has been the object of more research. The macro-level analysis based on national statistics showed that between 2003 and 2009, the consumption of cereals, including rice, increased in terms of expenditure. The report stated that processed food has higher environmental impacts compared to fresh produce. Therefore, the practice of food consumption can be recognized as a local affair, which is embedded in cultural contexts, historical trajectories, and institutional settings. The food consumption patterns at the local level have implications in terms of regional and global impacts. The impact assessment review suggests that middle-class food consumption practices exert high pressure on the environment, particularly concerning meat and dairy products, processed and imported food, and beverages, specifically bottled water. Food consumption has always been influenced by colonial trade routes and is still increasing due to globalization.

Rhondi et al. (2018) compared the land economic value (LEV) in an area with zero Agricultural Land Conversion (ALC) and that with high ALC. The result using econometric models demonstrates that there is a significant difference in land economic value in these areas. In the rural area, land creates a higher value when used for agricultural purposes, while in the peri-urban area or the area with high ALC, it creates a higher value when used for housing purposes. Agricultural production in rural areas has a value that is only 19% higher compared to housing uses. The study concluded that ALC will continue to increase in the peri-urban area because there is no sign of a decrease in the demand for housing. The study cited that while in the rural areas where Agricultural land conversion is not evident, in the future, there is a possibility that ALC will happen. ALC will cause a decrease in production and food supply. Another study about teff, an African cereal cultivated in Ethiopia, showed that there were different intensification outcomes like input application, and teff land productivity, that the government promoted to stimulate agricultural production in the country (Vandercasteelan et al., 2018). Input application includes fertilizer and improved seeds, while teff land productivity is measured by kilogram per hectare. This study investigated the relationship between agriculture and different-sized cities. A theoretical model showed that output prices and intensification decreased over distance to a primate city. Though, the presence of a secondary town introduces unbalanced outcomes in the relationship between urban proximity. It also showed that improved access for modern inputs could allow the farmers from the rural hinterland to improve agricultural production since they can now market to the nearby urban areas. Shen, Zhang, and Zhang (2020) assessed the environmental impacts of rice production and, rice production proved to achieve additional rice yields with minimal agricultural inputs because the ratooning crop reduces the process of land preparation, sowing, and transplanting, thus increasing the food supply. The study was conducted in Hubei, China which used Life Cycle Assessment (LCA).

Marques, Fuinhas, and Pais (2018) stated that the agriculture or food sector is a principal contributor to the depletion of natural resources. Global food production occupies more than a third of the world's land, and the study analyzed the interactions between food consumption, economic growth, and sustainable development. Researchers observed that developing countries need to have a long-term strategy to have food security. They should improve the supply of sustainable products by using advanced agricultural and food technology and must meet sustainable consumption to reduce public health issues and meet the minimum Greenhouse Gas Emissions target. Economic growth is very crucial for substantial development. However, a global strategy must also be exhibited towards a more sustainable path. The findings suggest that a relationship exists between food consumption and a country's economy relating to both economic growth and sustainable development. These associations are bidirectional, that is, both food consumption and the economic impact

on one another. Hence, the results suggested that the food industry stakeholders must coordinate with one another to achieve sustainable consumption and production. Also, to pursue efficient strategies that will blend both ecological sustainability and economic viability.

Transformation of Practices

Brossman and Islar (2019) explained that degrowth develops as an image of taking care of natural resources. It endorses new forms of living and production like eco-communities and cooperatives, also policies for work-sharing or basic and maximum income. Furthermore, it calls for equitably redistributing wealth both intra-generational, meaning from Global North to South, and inter-generational or from the current generation to the future generations. Living degrowth is conceptualized as a transformative endeavor with certain subjective, performative, collective, and structural aspects. Degrowth may be the answer to current problems of social inequality and ecological destruction. It is also an attempt to realize imagined futures of socio-ecological sustainability. Brossman and Islar explained the performative in which areas of life degrowth practices are applied and how these practices could be perceived from a transformation point of view. The study divided the data into five themes of performances, namely: rethinking society, acting political, creating alternatives, fostering connections, and unveiling the self. In the rethinking society, the participants argued to construct new ways like finding new orientations of lifestyle and life aims. In acting politics or political, it refers to practices of advocating degrowth by resisting developments deemed unfavorable such as the degradation of natural resources. In creating alternatives, one must be conscious of the environmental and social impacts of consuming products. In fostering connections, the participants believe that degrowth is about cooperation and community. Therefore, taking care of one another with the basic needs of the community is recommended. Lastly, living well and being happy is one of the most relevant aspects of one's life satisfaction, and this is under the unveiling of the self. Living degrowth for some participants is related to practices of being mindful. Mindful meaning focusing on just one thing at a time and living a simpler life.

According to Weiss and Cataneo (2017), degrowth has emerged as a radical call for a voluntary and equitable downscaling of the economy towards a sustainable, just, and participatory steady-state society. It saw that degrowth discourse has qualitatively discussed the inadequacies of the status quo but spent little effort to count the costs of continued economic growth and the well-being of the society. Therefore, to be successful, degrowth was recommended to identify a concrete and inclusive development perspective for powerful elites and the marginalized poor. Degrowth could also address psychological stress related to overconsumption, long working hours, and the commodification of social relations. It highlights the benefits of a simplified lifestyle and concludes that degrowth could contribute to a prosperous yet equitable, participatory, and environmentally sustainable society. Additionally, Akbulut et al. (2019) discussed five theses about degrowth and environmental justice movements in the field of ecological economics. It has generated substantial research and differentiated into three main currents: degrowth, a-growth, and steady-state economics. The first of them, degrowth, led to redistributive downscaling of production and consumption in industrialized countries to achieve environmental sustainability, social justice, and well-being. It is usually associated with the idea that small can be beautiful. Second is the a-growth or "agnostic" about growth. A-growth promotes carefully defined sustainable and welfare objectives. The third is steady-state economics or is also called the zero-growth. Zero growth supports non-growing economies based on a constant material and energy throughput and a

steady population. Among these three different currents, the study focused on degrowth because degrowth has the greatest potential to be transformative and can be converted into a social movement. The authors concluded that without a degrowth strategy, Environmental Justice movements will not fully succeed and vice versa. Daly (2018) stated that the world needs a non-growing economy that strives to maintain itself in a steady-state within the boundary of its maximum scale. Although the driving purpose of countries became economic growth, the depletion of the earth's resources was the unfortunate exchange. According to Daly, even if quantitative physical progress will be restricted, it would still be possible to experience qualitative improvement or development. Some people believe that wealth should not be limited, but it should stop unpleasant growth and encourage good growth. However, with the total limitation of development, people will be forced to choose good growth over bad. Then, good growth, or green growth, can at least be achieved.

In the study of Sandberg, Kockars, and Wilen (2018), degrowth criticizes economic development and searches for alternative ways to improve social and economic life. It suggests that society and consumption patterns must be transformed by reducing the use of private cars to achieve environmental sustainability. The study recommends having degrowth, over green growth since it has more potential in saving the environment from further degradation. Innovation can make an economy grow, or it can also destroy an economy. De Saille and Medvecky (2016) used a two-by-two matrix where one axis encodes the binary of responsible and irresponsible people, and the other with innovation and stagnation. Responsible innovation (RI) means to prevent reckless innovation and irresponsible stagnation. RI also aims to minimize ecological depletion and job losses. The study also focused on the RS or Responsible stagnation, which supports the discussion on the deliberate degrowth of unproductive and challenging sectors and technologies. Responsible stagnation aims at a fundamental transformation of production, consumption, and quality of life. Thus, the research does not consider RS as the opposite of RI, rather its vision.

A study about the food chains in Canada was conducted during the COVID-19 pandemic (Hobbs, 2020). There was panic-buying in many countries, so a demand-side-shock was experienced. There was also an adjustment to facilitate the movement of food destined for foodservice supply chains into the food retailing sector. The Canadian Food Inspection Agency (CFIA) has made several temporary changes to the regulations surrounding the labeling and packaging of food. In addition, there was a change in the income of consumers, affecting the food supply chains in their demand for different product categories. Hence, the need for less expensive products increased. On the supply side, labor shortages became one of the concerns due to self-isolation, sickness, or movement restrictions. There was also a shift to online food orders and food delivery. The study concluded that the COVID-19 pandemic holds some implications for Canadian food supply chains. One is a need to focus on maintaining and enhancing supply chain resilience. The just-in-time supply chain model is efficient and effective under normal circumstances. Responsiveness is also an essential dimension of flexibility. Future efforts to enhance such adaptability are through strategic inventory management plans, and flexible acquisition strategies are highly needed.

According to Otero et al. (2020), a Shared Socioeconomic Pathway (SSP) was initiated to put humanity on the way to being biodiversity-friendly. A crucial step was made in the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) Global Assessment in acknowledging the need to move away from the current growth paradigm. A continuous search for policy options that can reduce ecological losses while the economy grows is being studied. Several approaches were suggested, and one of

them is the conservation policy which might involve a positive, zero, or negative growth. This SSP is compatible with the biodiversity and well-being targets. It concluded that a transformative change could benefit nature and the people. Another study about degrowth and post-capitalism (Schmid, 2019) mentioned the green growth theory, which underlies the green economy and modernization approaches. It assumes that economic growth and development can harmonize with the earth's ecological limits. It depends on efficiency between resource input, output, and consistency strategies. Technological innovation and marketization are essential strategies that should be put into practice. It aims for an overall decrease in resource usage while maintaining growth. Degrowth originated in the spirit of a radical critique of consumerism, development, and capitalism. The term degrowth is often limited to GDP degrowth, consumption degrowth, work-time degrowth, or physical degrowth. But this word should not be taken negatively. The strategies, priorities, and scope of transformative ideals are said to vary between different degrowth approaches. These strategies do not only explain the why's, but the how's, and promote a radical change for a more equitable, sustainable, and dignified survival of human and nonhuman species. Another research on degrowth and environmental justice (EJ) movements was conducted by Labajos et al. (2018). It used semi-structured interviews, and for many EJ activists, the factors for debate on degrowth are not significant.

In the study of Asara et al. (2015), the pathway towards a sustainable future is viewed in a democratic and redistributive downscaling of the biophysical size of the global economy. The transformation can address the root causes of social and environmental degradation. In doing so, the micro-and macro-level changes in rationality, consumerism, utilitarianism, and productivity, should be keenly analyzed. To secure the basic needs of people, non-capitalist grassroots and economic practices like cooperatives, ethical banks, and urban gardens should be done. In conclusion, the study recommends that humanity must uncover the ideology and practice of economic growth since it is the ultimate cause of unsustainability in our society. Chatterton and Pusey (2019) focused on the agenda for change, criticizing the current capitalist system and the explored post-capitalism. The paper discussed three terrains of transformation: first, enclosure and commons; second, commodification and socially beneficial production; and third, alienation and doing. Enclosure symbolizes the violent tendencies of capitalism like forced labor, slavery, and the factory system. These enclosures coexist with the commons that become an instrument for social wealth and production and a struggle against capitalism. Commodification targets profit maximization since everything is considered an object of trade. As it transforms to post-capitalism, it will provide a socially helpful production and introduce value creation. Lastly, alienation involves workers that sell their labor and produce goods for other people. The activity that engages in social reproduction to enable people to live a good life or have a socially valuable doing opposes separation.

According to Vandeveter, Cattaneo, and Zografos (2018), the multi-level perspective (MLP) should incorporate a pathway for change that can attain a niched symbiosis. MLP can be contextualized as an alternative economy drawing on values like solidarity economies, localism, and economic democracy. Thus, in the Pluriversal pathway niche, people play a central role in going through a symbiotic and complementary way with other opportunities, such that a heterogeneous regime is achieved. A shift toward a more localized societal arrangement and decision-making to individuals and communities is recommended to degrowth research. Degrowth should continue to expand and exert influence on the present system to help the people survive in a long-term environmental, social and economic crisis (Vandeveter et al., 2018). According to Leonardi (2018), the internalization of ecological

limits represents a shift in the history of capitalism. It analyzed that if class and ecology are two sides of the same coin, then the capitalist value can be said as a class dimension of environmental conflicts and an ecological element of class struggle. Degrowth can be a key to conceiving the working class for wage support, also as a potential natural agent to fight against capitalist exploitation. Muradian (2019) claimed that the degrowth movement is more of a Eurocentric project since it does not resonate with the values of the lower-income class. Frugality as a choice is not that appealing to people, especially those who do not have enough money and food. Voluntary frugality has a slim chance to balance the present issues regarding the decline of progressive values and environmental concerns. The research showed a vast gap between degrowth advocates and the disadvantaged social groups in low-income countries. And this gap was overlooked by degrowth proponents.

3. METHOD

3.1. Research Design

This study estimates the relationship of Household Final Consumption Expenditure (HFCE) per region and *Palay* production per region in the Philippines, considering 15 regions for 2009 to 2018 panel data. This study also estimates the relationship of Gross Regional Domestic Product (GRDP) and HFCE per region using the same panel data. This will help verify how income, which is represented by the GRDP, affects the consumption expenditures. This study gathered data from the Philippine Statistics Authority (PSA). Panel data or longitudinal data set follows a given sample of individuals over time. Panel data provides a large number of data points, increasing the degrees of freedom and reducing the collinearity among explanatory variables—hence, improving the efficiency of econometric estimates.

3.2. Statistical Treatment

Considering the panel regression model, where Z_i is the unobserved time-variant heterogeneity across the regions $i = 1, \dots, n$.

$$Y_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 Z_i + u_{it}$$

Our goal is to estimate β_1 which is the effect of X_i on Y_i . Letting $\alpha_i = \beta_0 + \beta_2 Z_i$ we obtain

$$Y_{it} = \alpha_i + \beta_1 X_{it} + u_{it}$$

Having individual specific intercepts α_i , $i = 1, \dots, n$, where each of these can be understood as the fixed effects of entity i , which is the fixed effects model as shown below,

$$Y_{it} = \beta_1 X_{1,it} + \dots + \beta_k X_{k,it} + \alpha_i + u_{it}$$

where $i = 1, \dots, n$ and $t = 1, \dots, T$. The α_i are entity-specific intercepts that capture heterogeneities across regions. That is,

$$LPalay_{it} = \beta_1 HHFCE_{1,it} + RegionFixedEffects_i + u_{it}$$

where $LPalay$ is the logarithm of *Palay* production per region, HFCE is the household final consumption expenditure, and *RegionFixedEffects* is the entity-specific intercepts that capture heterogeneity across regions. The fixed effects (FE) model eliminates the effect of unobserved heterogeneity. But, with different levels of engagement in *palay* production and different sizes in region, it is necessary to check heteroskedasticity problem and autocorrelation. In case that heterogeneity is present, random effects (variance components model) provides the option to take into account heterogeneity across regions in the regression coefficients. That is,

$$Y_{it} = \beta_0 + \beta_1 X_{1,it} + \dots + \beta_k X_{k,it} + \alpha_i + u_{it}$$

$$LPalay_{it} = \beta_0 + \beta_1 HFCE_{1,it} + RegionRandomEffects_i + u_{it}$$

4. RESULTS AND DISCUSSION

Through Panel OLS, analysis shows that the GRDP is insignificant to *Palay* production, either in real data or in log form. The probability F-statistic is not significant, and the Durbin Watson stat shows that there is an autocorrelation error in the regression output using the Panel OLS. The possible reason for the insignificant relationship is that *Palay* production is not affected by the GRDP. That means that if GRDP increases or decreases, regions will still produce *palay* since this is the staple food of the Filipinos.

Table 1 Panel OLS of GRDP and *Palay* Production from 2009-2018

Variable	Coefficient	Prob
Constant	14.36350	0.0000
Log GRDP	-0.033377	0.6807
R-squared	0.001147	
Prob (F-statistic)	0.680745	
Durbin-Watson stat	0.015934	

Using Fixed and Random Effects Panel regression, GRDP becomes significant to *Palay* production using log function and the fitted terms are the same as the actual value based on residual graph, and the relationship is positive. As the log GRDP increases, log *palay* production increases by 0.327638 as shown in Table 2 using the Fixed Effects. As the percentage change of GRDP increases, the percentage change in *Palay* production increases. This shows that if there is a higher income, there can be a higher yield.

Table 2 Fixed Effects on GRDP and *Palay* Production 2009-2018

Variable	Coefficient	Prob
Constant	7.234622	0.0010
Log GRDP	0.327638	0.0030
Cross-section fixed (dummy variables)		
Period fixed (dummy variables)		
R-squared	0.993054	
Prob (F-statistic)	0.000000	
Durbin-Watson stat	1.467015	

In Table 3, analysis using Random Effects shows that as the log GRDP increases, log *Palay* production increases by 0.230439.

Table 3 Random Effects on GRDP and *Palay* Production 2009-2018

Variable	Coefficient	Prob
Constant	9.153992	0.0000
Log GRDP	0.230439	0.0000
Cross-section random		
Period random		
R-squared	0.119455	
Prob (F-statistic)	0.000015	
Durbin-Watson stat	1.327885	

Table 4. Hausman Test cross-section random effects test comparisons

Variable	Fixed	Random	Var(Diff)	Probability
Log GRDP	0.240233	0.230439	0.000090	0.3009

Table 5. Hausman Test Period random effects test comparisons

Variable	Fixed	Random	Var(Diff)	Probability
Log GRDP	0.278728	0.230439	0.007609	0.5799

Table 6. Hausman Test cross-section and period random effects test comparisons

Variable	Fixed	Random	Var(Diff)	Probability
Log GRDP	0.327638	0.230439	0.009078	0.3077

Regarding Household Final Consumption Expenditure (HFCE) per region and *Palay* production per region, the null hypothesis was accepted since there is no significant relationship between HFCE and *Palay* Production. The Residual Cointegration Test was first conducted. The Panel ADF-statistic probability of 0.0227 indicates that the variables are stationary and cointegrated.

Pedroni Residual Cointegration Test

Series: *Palay* HFCE

	Statistic	Prob	Statistic	Prob
Panel ADF-Statistic	-5.327607	0.0000	-2.000574	0.0227

Series: Log *Palay* HFCE

	Statistic	Prob	Statistic	Prob
Panel ADF-Statistic	-2.770473	0.0028	-2.135900	0.0163

The Fixed Effects Model shows that the Household Final Consumption Expenditure is not significant to *Palay* production. This means that the production of *palay* is not affected by the HFCE.

Table 7. Fixed Effects Model HFCE and *Palay* production

Variable	Coefficient	Prob
Constant	13.70471	0.0000
HFCE	0.030081	0.6805
Cross-section fixed (dummy variables)		
Period fixed (dummy variables)		
R-squared	0.992947	
Prob (F-statistic)	0.000000	
Durbin-Watson stat	1.412805	

Table 8. Random Effects Model of HFCE and *Palay* production

Variable	Coefficient	Prob
Constant	13.69687	0.0000
HFCE	0.056314	0.4315
Cross-section random		
Period random		
R-squared	0.004659	
Prob (F-statistic)	0.622613	
Durbin-Watson stat	1.238722	

Table 9. Hausman Test cross-section random effects test comparisons

Variable	Fixed	Random	Var(Diff)	Probability
HFCE	0.054631	0.056314	0.000008	0.5486

Table 10. Hausman Test Period random effects test comparisons

Variable	Fixed	Random	Var(Diff)	Probability
HFCE	0.032054	0.056314	0.000168	0.0609

Table 11. Hausman Test cross-section and period random effects test comparisons

Variable	Fixed	Random	Var(Diff)	Probability
HFCE	0.030081	0.056314	0.000216	0.0741

Regarding Gross Regional Domestic Product (GRDP) and Household Final Consumption Expenditure (HFCE), GRDP is significant and has a positive relationship with HFCE at Random Effects. This means that if Gross Regional Domestic Product increases, the HFCE will also increase. Therefore, the null hypothesis was rejected.

Table 12. Fixed Effects Model of HFCE and GRDP

Variable	Coefficient	Prob
Constant	-1.372358	0.6818
Log GRDP	0.084468	0.6176
Cross-section fixed (dummy variables)		
Period fixed (dummy variables)		
R-squared	0.918592	
Prob (F-statistic)	0.000000	
Durbin-Watson stat	2.058611	

Table 13. Random Effects Model of GRDP and HFCE 2009-2018

Variable	Coefficient	Prob
Constant	-5.333941	0.0000
Log GRDP	0.284676	0.0000
Cross-section random		
Period random		
R-squared	0.311936	
Prob (F-statistic)	0.000000	
Durbin-Watson stat	1.737164	

Table 14. Hausman Test cross-section random effects test comparisons

Variable	Fixed	Random	Var(Diff)	Probability
Log GRDP	0.142120	0.284676	0.003244	0.0123

Table 15. Hausman Test Period random effects test comparisons

Variable	Fixed	Random	Var(Diff)	Probability
Log GRDP	0.325735	0.284674	0.000364	0.0314

Table 16. Hausman Test cross-section and period random effects test comparisons

Variable	Fixed	Random	Var(Diff)	Probability
Log GRDP	0.084468	0.284676	0.027125	0.2241

The results attest to the Relative Income Theory of Consumption since the Gross Regional Domestic Product, which can be considered as the aggregate income, shows a direct relationship with the Household Final Consumption Expenditure or the aggregate consumption. The results also reveal that the production of *palay* is sufficient enough to satisfy the demand of the consumers. The production and supply of *palay* are sustainable, and there is no need for importation. The more important action is the efficient distribution of the *palay* produced. So far, the outcome does not require a degrowth in the Philippines in the production and consumption of *palay*.

5. CONCLUSION

The treadmill of production is one of the reasons for environmental destruction (Rudel et al., 2011). The industrial revolution lightens the work of people but burdens the ecology. It satisfies the needs and wants of consumers and brings profit to capitalists but cripples the resources. According to Pooran Desai (2018), political systems are geared toward GDP growth and are dependent on money for survival. Economic growth causes climate change and growing wealth inequality. On account of the continuous decline of resources simultaneously with economic growth and development, degrowth is considered to be an answer. It can be a way to support the Sustainable Development Goals to transform the world and save the environment.

This study evaluated the Philippine Economy's Income, production of *palay*, and household final consumption expenditure to analyze if the country needs to have degrowth to conserve the environment. The data on the Gross Regional Domestic Product (GRDP), *Palay* production per region, and Household Final Consumption Expenditure (HFCE) per region were used. The relationship between GRDP and *Palay* production per region was estimated by using Panel Least Squares, and it showed that there is a positive and significant relationship. That means that an increase in the GRDP will increase *Palay* production per region. The estimated relationship of the HFCE and *Palay* production per region exhibited an insignificant relationship, using Fixed Effect Model. Therefore, there is no relationship between consumption and production of *Palay*, or that *Palay* production is not dependent on the final consumption of the consumers. Lastly, using the Random Effects Model, the estimated GRDP and HFCE have a significant, positive relationship. The result manifests that if income increases, consumption will also increase. Therefore, since the production of *palay* (unmilled rice) is adequate for the consumption of the Filipinos, the authors conclude that the Philippines does not need to degrow. The supply of *palay* in the country remains to be sustainable. According to the Department of Agriculture 2020 Report (DA, 2020), amidst the challenges like the pandemic and natural calamities, the Philippine Statistics Authority (PSA) projected that the *Palay* production will reach 19.44 million metric tons in 2020. The unit claimed that the Rice Tariffication Law and Rice Competitiveness Enhancement Fund (RCEF) that includes provision for farm machinery, credit, quality seeds, and technology with training, pave the way for this growth in *palay* production.

This study focused on the production of *palay* in the regions and its relationship to GRDP and household consumption to equate the sustainability of *palay* supply. It is proposed to broaden the scope of the study and not only focus on the *Palay* production per region but the total market basket products included in the computation of the CPI or Consumer Price Index (NAP, 2000). With this, it can give more concrete details on the Household Final Consumption Expenditure. It will present a greater perspective if there is sustainability in the production of the basic demands of the society. Other researchers can scan the agricultural lands converted into commercial or residential areas. This recommendation can also manifest if the environment is being used for a better purpose and how it affects the sustainability of food supply in the Philippines per region. In addition, studies on the effects of basic income or the cash transfer system can be helpful to see if it makes consumption more sustainable. Also, a zoom-in of particular manufacturing companies if they are practicing sustainable production to preserve the environment. These are but a few suggestions on the research to pave the way to solutions to save the planet. Nevertheless, a change of praxis is needed to accept degrowth and prioritize the welfare of the earth.

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