

CIRCULAR ECONOMY AND WASTE RECYCLING-REVIEW, CHALLENGES AND OPPORTUNITIES IN VIETNAM AND FRANCE

Nguyen Thi Viet Ha¹, Alexandre Levillain-Tomasini², Nguyen Thi Xuan Thang³

Abstract: *Circular economy (CE), intending to provide a better alternative to the dominant economic development model, has become recently a familiar concept globally. CE aims to maximize the use of resource efficiency in order to achieve a better harmony between economy, society and environment factors. This paper is a review of CE with reference to waste recycling, challenges and future direction of CE in both Vietnam and France.*

Keywords: Circular economy, Reduce-reuse-recycle, Waste recycling, Vietnam, France.

1. INTRODUCTION

Historically, all societies put into practice Lavoisier's famous principle "*nothing is lost, nothing is created, everything is transformed*". The transition toward a circular economy (CE) model is based on the principle of increasing the efficiency of resource use through greater recycling and reuse. However, Ghisellini et al. (2016) address that recycling is globally focused, rather than focusing on reuse. Moreover, a CE sometime is called a recycle-oriented economy. CE is considered a global business model, suitable for macroeconomic planning and employment growth (Capron and Quairel, 2004; Collet, 2014), whereas CE requires the adoption of cleaner production patterns at company level, an increase in the responsibility and awareness of producers and consumers, the use of renewable technologies and materials associated with the adoption of appropriate policies and tools (Ghisellini et al., 2016).

In the area of CE, Vietnam utilizes a global approach of Reduce-reuse-recycle (3R). This initiative is inspired from the 3R model of Japan

with focus on promoting 3R activities (Ngo & Pham, 2011). The basic principle for the application of 3R in Vietnam is the "*polluter pays*" opposed to state or private responsibility (Schneider et al., 2017). The strategy is to apply simultaneous implementation of different measures to prevent and reduce waste, and to increase waste collection, the percentage of waste being recycled and reused, thereby decreasing the waste dumped in landfills.

In France, a procedure called "*waste status output*" was created in 2014 to legally allow waste to become products. According to the legislature, waste is defined as "*any residue of a production process, processing, or use, any substance, material or product, or more generally, any discarded item or an item that the holder intends to discard.*" In civil law, abandonment and willingness to abandon an object label an object as waste. Obtaining this label triggers a legal obligation "*Any person who produces or holds waste under conditions likely to produce harmful effects on soil, flora and fauna, to damage sites or landscapes, to pollute the air or water, to cause noises and odours and generally to undermine the health of humans and the environment is obliged to dispose of or ensure disposal in accordance with this Act under conditions to avoid those effects*". CE has been established in France since the Energy Transition for Green Growth

¹IPAG Business School LAB, 184 Boulevard Saint Germain 75006 Paris, France

² La FACO LAB, 115 Notre-Dame des Champs 75006 Paris, France

³ Department of Environment, Thuyloi University, 175 Tay Son, Dong Da, Ha Noi, Vietnam

Act introduced and outlined the steps in 2015.

This paper is structured as follows. The disciplinary sections are provided with review, challenges and future direction of CE in Vietnam and France. Overlapping and/or interdependent issues from each discipline are identified within each section. The interdependent issues can be considered in terms of opportunities and challenges in the context of implications for the government of Vietnam and France.

2. REVIEW OF CE IN VIETNAM AND FRANCE

2.1. Overview of CE

2.1.1. In Vietnam

Vietnam has recognized the importance of environmentally sustainable development and considers the 3R plans as a key factor in successful waste management policy (Dung, 2015). National Strategy on 3R with target to 2020 provides for the following goals: (1) Reduction of waste generation; (2) Collection rate for solid waste: 95%; (3) Reuse and recycle rate: 60%; and (4) Solid waste disposal: 40% of collection amount (Best, 2017).

To encourage the development of 3R, the Government has invested for strategic implementation of 3R by multiple activities. They include: (i) National 3R strategy promulgation; development of policy instrument on 3R; (ii) 3R demonstration project and promotion, with focus on urban areas of Hanoi, Hochiminh city and Danang; (iii) Development of environmentally sound technologies for hazardous waste and 3R with priorities areas in municipalities and industrial zones; (iv) The set up and develop a regulatory framework with objective of establishing the circulation

economy in Vietnam (Schneider, et al., 2017); and (v) Encouraging and supporting communities to develop model of ecological urban center, green countryside, green house model, and waste material sorting model at source by the method of 3R to improve the energy using efficiency in Decision n^o 1393/QD-TTg on approving “National strategy on green growth for the period 2011- 2020 with vision to 2050” in September, 2012.

In addition, Vietnam’s Law on Environmental Protection (LEP) was enacted in 1994 and updated and strengthened in 2005 and 2014. Central-level attention on protecting the environment also includes setting environmental sustainability goals in its 2015-2020 long term plan, issued in 2016. Seven decrees were issued to implement application of this amended law, specially, in February 2017, Decree n^o 155/2016/ND-CP on Penalties for Administrative Violations against Regulations on Environmental Protection has been promulgated.

Amendments to laws relevant on promoting 3R activities by the Vietnam government that include: (i) Increased emphasis on reuse/recycling is on the list of encouraged activities; (ii) Emphases that reusable/recyclable waste should be reused/ recycled maximally to minimize waste to be treated by other methods; and (iii) For the State to offer incentives for energy recovery from waste, waste reuse/recycle.

Kadam & Sarawade (2016) indicate that the amount of municipal solid waste generated per person in Vietnam in 2016 is at 0.4 kg/day at national level for the 22 year enactment of the fundamental law (see *Table 1*).

Table 1. The quantities of solid waste in Vietnam derived from Kadam & Sarawade (2016)

Municipal Solid waste generation	Tons/yr
1) National	12,800
2) Urban areas	6,400
3) Rural areas	6,400
Hazardous waste by Industries	128.4
Non-hazardous waste generation	2,510

Municipal Solid waste generation	Tons/yr
Hazardous health care waste generation	21,000
Hazardous waste generation from agriculture	8,600
Amount of stockpiled agriculture chemicals	37,000
Municipal Solid waste generation by each person (kg/day)	
1) National	0.4
2) Urban areas	0.7
3) Rural areas	0.3
Collection of waste (% of waste generated)	
1) Urban areas	71%
2) Rural areas	<20%
3) Among Urban poor	10-20%
N^o of solid waste disposal facilities	
1) Dumps and poorly operated landfills	74
2) Sanitary landfills	17
Capacity for hazardous waste treatment (%)	50%

Regulations concerning the CE already exist in Vietnam with the notion of 3R which is structurally similar with CE regulation in Japan (Ngo & Pham, 2011). The government of Vietnam is clearly invested in promotion of CE. The particularity is the implementation of this disposition in this country, of which concerns are: *first*, even though the rate of recovery and recycling in Vietnam is relatively high, this rate is explained by economic reasons rather than ecological awareness. In fact, waste reuse and recycling are already common practices in many households: the incentive is not to minimize negative environmental effect, but rather to make the most of what they could make money.

Second, as in many developing countries, most recyclable and reusable waste in Vietnam is collected by the informal recycling sector, including agents such as waste-pickers, collectors, garbage truck helpers and scavengers, etc. The collection takes place in many points such as the generation points, waste storages, collection, transfer points and at disposal sites (see *Figure 1*).

Specially at the open and controlled dumps, as there has not operational procedure for waste management activities, and private waste pickers operate there to sort through the trash

for recyclable. Those recyclables, once collected and sorted, have been sold to the distributors who will then ensure be clean, sort, and package the recyclable material before reselling. Therefore, factories and enterprises of waste recycling contribute significantly to reduce the waste load (Mongtoeun et al., 2014; Omidiani & Hashemi Hezaveh, 2016; Pirani & Arafat, 2014; Hoang et al., 2015; Giang et al., 2017; Pham et al., 2018). Due to lack of official data, it has been estimated that the value of recyclable materials traded by informal sector in Hochiminh city is approximately VND 135 billion (around 9 million USD). The most commonly recyclable materials are plastics, followed by paper and metal (VEM 2014).

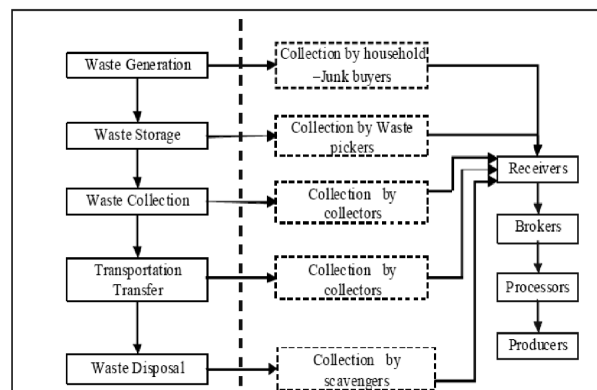


Fig. 1. Recycling waste flow derived from Thanh & Matsui (2011)

Third, ultimate handling of recycling activities in Vietnam are various for different types of waste. For example, in the field of hazardous waste, the main activities are cleaning empty drums, tanks and recycling for other purposes. Some agents have exclusively specialized in oily waste recycling. Recycling in those cases which do not imply any purification of the waste, just mixing and briquette formation for utilization as any energy source in factories and appliances where there are not treatments of the flue gas. In many cases, the activities of these companies are unlikely to be environmentally appropriate and there are potential for pollution of air and water. Moreover, other particular concerns arise from the reuse of materials for some specific classes of hazardous waste. For example, old transformers have been sold as scrap, and those who purchase these to recycle the materials will inadequately dispose of the transformer fluid, which contains PCBs. In the field of Electronic waste (E-waste), Vietnam has informal structure of peddlers who collect E-waste from households and sell them to electronic shops, which further classified by the repairers or shopkeepers (Levillain, A. & Nguyen, H. 2017). The repairable instruments are reworked on and sold in second hand market while usable parts of non-repairable instruments are sent to

factories. Instruments which are impossible to be reused are sent to dismantling workshops instead of landfills. Dismantled parts are sent to rural areas if they can be used by craftsman (Nguyen et al., 2010).

2.1.2. In France

In France, according to the new Article L. 541-4-3 of 2010-1579 of the Environmental Code from the Order of December 17, 2010, “a waste ceases to be waste after being treated in a facility subject to authorization or declaration under the Water Act or in a facility subject to authorization, registration or declaration under the law on classified installations”. For this, the waste must have undergone a recovery operation, including recycling for reuse, and must meet criteria completing all of the following conditions.

In the mid-1990s, almost half of the waste was landfilled (storage). However, those proportions have clearly decreased (e.g., in 2000 it reached 43% of the tonnages and 26% in 2013, respectively). Recycling and energy recovery or organic recovery (composting, methanisation, and mechano-biological treatment) accounted for 73% of municipal waste in 2013, compared with 53% in 2000. Incineration without energy recovery recently seems to be marginal. The evolution (in tons) of household waste treatment in France between 2001 and 2013 is shown in *Figure 2*.

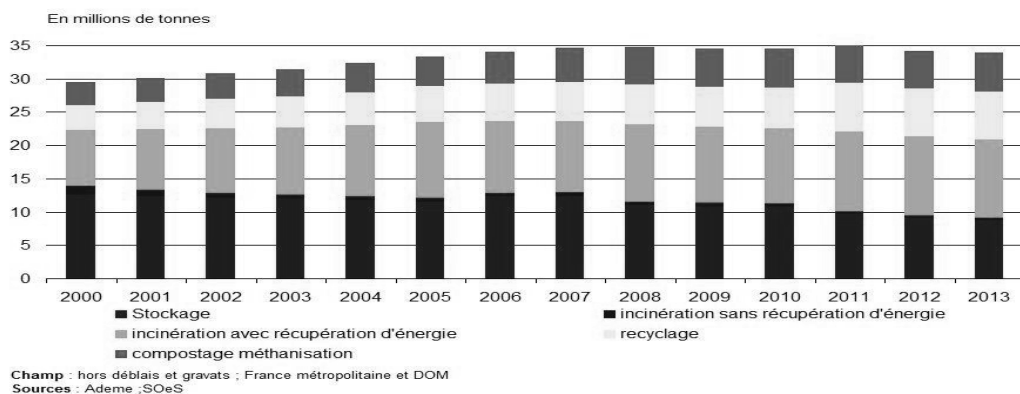


Fig. 2. Evolution of household waste treatment in France between 2000 and 2013 derived from Ademe (2016)

Since February 2013, the French Institute of CE, created by MP François-Michel Lambert,

worked on developing a framework bill by 2015. A preparation workshop on legislative

regulatory and tax was led by Carl Enckell, an attorney at the Paris Bar, and the ongoing work led to a White Paper at the end of 2014. As presented in *Figure 3*, as of the nineties, France is subject to regional sectoral regulations, and at present imposed regulation globally.

In addition, on August 17, 2015, a law (n°2015-992) on the energy transition for green growth was enacted by the French Parliament. This law will standardize CE across the country with general objectives.

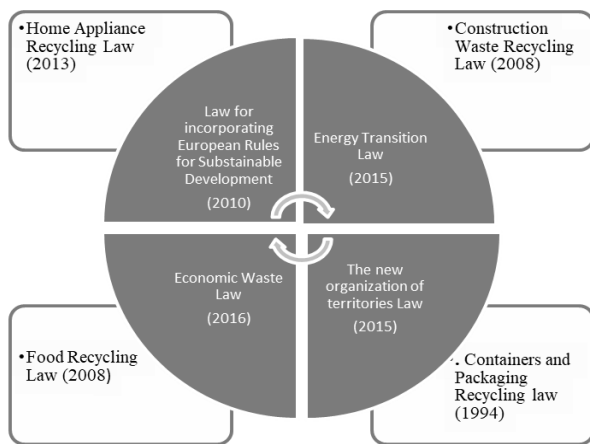


Fig. 3. The body of Circular Economy Law in France

According to the energy transition law, the main axis, including saving and using high-resources, will change patterns of consumption, production, distribution, and logistics flow management of resources to better agree with more CE-compatible economic approaches, principles, and investment. Various operational measures are possible, such as supporting the eco-design of products by companies using eco-modulations on the eco-design criteria of sustainability, scalability, reparability, and recyclability. CE-based incentives have also had visible impacts of industrial sector. A true CE label does not only target a specific product but also a manufacturer. For example, the label of the “cradle to cradle” (C2C) is a registered trademark and certification designed of CE to have a positive impact on people and the environment through the manufacturing of products that are recyclable, non-toxic, biodegradable, or with infinite usefulness.

As described, France has given rise to an actual

potential for comprehensive adoption to a CE (as opposed to existing linear-economy) modes with an expanded recycling of waste and a reduction in resource consumption associated in the COP 21 of Paris in the end of 2015.

For advocacy, several strategies have been applied for the promotion of CE in France. *First*, public procurement rules may be necessary to support new recycling business. *Second*, tax reductions for recycled products have been applied. *Finally*, an appropriate legal framework to fight against illegal trafficking of materials has been declared as a global.

Therefore, CE recently has become inevitable. Every country needs to encourage the application of CE for the durable development, especially for solid waste as the amount of solid waste increase steadily and the composition of solid waste becomes more and more complicated. Moreover, waste recycling and reduction are the momentous solutions of waste management hierarchy and bring many benefits to business sectors and society (Milanez et al., 2015).

2.2. Challenges and future direction of CE

2.2.1. In Vietnam

Generally, Vietnam has a large potential for CE as the main proportion of the waste flows which are recyclables (GSO-Vietnam, 2014). Unfortunately, there are some challenges which have hindered expansion. *First*, the total implementation of the 3R programs in Vietnam is currently only in demonstration models in Hanoi, Hochiminh City and Danang (HCMC-DONRE, 2014). In addition, the results of these programs are not satisfactory due to flaws in the implementation plan, as well as the inappropriate allocation of time and funds. Many 3R activities are not suitable for the actual conditions, associated with the lifestyle, activities of people and communities. At times, publicly funded programs, after a pilot period, initiatives are sometimes terminated. *Second*, reports of activities concerning 3R in Vietnam are not detailed and complete to draw lessons learned for other projects in the future. Thus, Vietnamese are not sufficiently informed about the environmental

situation of their country. They do not all have access to information in a transparent way, and do not realize the consequences of all their actions. *Third*, though the legal framework on CE exists and the recycling targets of the National Waste Management strategy provide a sufficient framework for a CE in Vietnam, focusing on a complete waste collection by 2025, the implementation of the law is relatively weak. Likewise, there are no real penalties for the violation of the law and there is not enough sectoral legislation. Encourage policies for 3R programs are not enough attractive to encourage 3R activities. *Fourth*, recycling is only in small sized, spontaneous and difficult to control. In addition, recycling technology for production is backward, especially in craft villages and there are many manual stages. Equipment is mostly old, acquired from the discharged factory. Recycling process cause environmental damage and product low quality production.

To deal with these challenges, we outline the following approaches: (i) To consolidate social/cultural awareness towards environmental sustainability which plays an important role in development of CE, especially focusing on some kinds of waste treatment needs to be sorted at source; (ii) To continue applying the preferential policies to organisations and individuals who engaged in the recycling of wastes and products and who invest in the construction of waste recycling facilities (Thanh & Matsui, 2011); and (iii) To investigate more on the subject to see if there is possibility to develop formal services and agents involved recycling.

2.2.2. In France

France has introduced a legislation to promote CE throughout the country. The need for green taxation and the financial support of public authorities has become obvious, and the state supports CE actions in each territory. The development of CE in France is made around five main axes (Levillain & Matsumoto, 2017). The most important are: (i) Encouraging and supporting green purchasing behavior: it will be beneficial to also activate public procurement by introducing and giving weight to CE clauses in public procurement, as only 6.7% of public procurement in 2013 included such clauses (GUHL A, Livre

Blanc sur l'Economie Circulaire, Grand-Paris, 2016). Green lease legislation (“annexe environnementale”) has been in place since 2013. As part of the drafting of commercial leases, rent is indexed to the environmental work carried out by the lessor. To further this effort at the consumption level, consumers should be encouraged to purchase products from eco-design and waste recycling via a reduced VAT and informative labelling; and (ii) Supporting innovation and experimentation of recycling business: academic research and social entrepreneurship are driving the promotion of CE. Research chairs within universities or business schools can ensure that their research efforts reflect on the emergence of this new economic model and quantify the economy of use. Considering the rapid expansion of the recycling business in Japan, we expect that CE will create new recycling businesses in France. The creation of business incubators facilitating eco-design approaches is also under consideration. Operating as a resource center, an incubator supports start-ups and businesses in raising awareness of the challenges of CE and eco-design, encouraging innovation and attracting partners and investors.

The new French government is aware of the importance of promoting the CE. The National Institute of CE has proposed to this government a real roadmap linking the approach to a new economy to a better recovery and recycling waste. By 2025, the goal is to recycle 100% of plastic waste (FEDEREC, Meeting of January 30th 2018). Regarding taxation, the same study recommends a reduced VAT and a surcharge on the levies of natural resources; Regulation requires adjustments to remove the obstacles to the CE and limit less virtuous behaviors, with coherence within European countries and by implication globally at the national level recognized as important.

3. CONCLUSIONS

CE is receiving increasing attention worldwide as an effective method to overcome the current production and consumption model based on continuous growth and increasing resource throughput.

The notion and the development of CE in each

country, including Vietnam and France have their own characters, opportunities and challenges.

In Vietnam, regulations concerning the CE already exist with the notion of 3R which is structurally modelled on methods also used in Japan. Vietnam has a large potential for CE,

however, there are a number of challenges in implementing 3R policies.

In France, the law is proactive for stimulating the CE strategy to gear towards applying eco-conception, industrial ecology, and transitioning into the green economy.

REFERENCES

- Ademe. (2016). *Statistiques relatives au développement durable et à la gestion des déchets*. /<http://www.statistiques.developpement-durable.gouv.fr/lessentiel/ar/286/0/traitement-dechets.html> (access 2017.07.25).
- Best, A. M. (2017). Country Risk Report-Vietnam. from <http://www3.ambest.com/ratings/cr/reports/Vietnam.pdf>
- Byer, P. H., Hoang, C. P., Nguyen, T. T. T., Chopra, S., Maclaren, V., & Haight, M. (2006). *Household, hotel and market waste audits for composting in Vietnam and Laos*. *Waste Manage. Res.* (24), 465-472.
- Capron, M., & Quairel, F. (2004). *Mythes et Réalités de l'Entreprise Responsable*. Paris: La Découverte.
- Collet. (2014). *Recyclage, économie circulaire et emploi*. *Journal de l'environnement et techniques* n° 333, 60-62.
- Dung, K. M. (2015). *Assessment of Effective Economic Environment-Proposed Feasibility Mining Scenarios after Gò Cát Landfill Site Stops Receipting of Garbage*. IUH HCMC, Institute for the Environmental Science, Engineering and Management, Hochiminh, Vietnam.
- European Commission. (2017). *Report from the commission to the European Parliament, the council, the European economic and social committee and the committee of the regions: on the implementation of the circular economy action plan*. <http://ec.europa.eu/environment/circular-economy/implementation_report.pdf> (access 2017.05.26).
- Export.gov. (2017). Vietnam - *Environmental and Pollution Control Equipment and Services*. from <https://www.export.gov/apex/article2?id=Vietnam-Environmental-and-Pollution-Control-Equipment-and-Services>.
- Giang, H. M., Takeshi, F., & Song Toan, P. P. (2017). *Municipal Waste Generation and Composition In A Tourist City - Hoi An, Vietnam*. *JSCE* (5), 123-132.
- Ghisellini, P., Cialani, C., & Ulgiati, S. (2016). *A review on circular economy: the expected transition to a balanced interplay of environmental and economic systems*. *Journal of Cleaner Production*, 114, 11–32. <https://doi.org/10.1016/j.jclepro.2015.09.007>.
- GSO-Vietnam. (2014). *Statistical Handbook of Vietnam. General Statistics Of ce (GSO) of Vietnam. Ha Noi, Vietnam*.
- HCMC-DONRE. (2014). *Report on Solid Waste Management in Hochiminh City. Hochiminh City Department of Natural Resources and Environment (HCMC DONRE)*. Hochiminh City, Vietnam.
- Hoang, T. T., Helmut, Y., & Yoshiro, H. (2015). *Analysis of the environmental benefits of introducing municipal organic waste recovery in Hanoi city, Vietnam*. *The 5th Sustainable Future for Human Security (Sustain 2014)*. *Procedia Environmental Sciences* (28), 185-194.
- Kadam, M. S., & Sarawade, S. S. (2016). *Study and Analysis of Solid Waste Management Challenges and Options for Treatment (Indian Villages)*. 5th National Conference RDME 2016. *IOSR Journal of Mechanical & Civil Engineering (IOSRJMCE)*, 15-22.
- Le, H. V., Nguyen, V. C. N., Nguyen, X. H., Do, N. Q., Warinthorn, S., Catalin, S., et al. (2009). *Legal and institutional framework for solid waste management in Vietnam*. *Asian Journal on Energy and Environment*, 10(04), 261-272.

- Levillain, A. & Masumoto, S. (2017). *Circular Economy and Waste-Management: a comparative study between Japan & France*. International Journal of Environment & Waste Management, 1-10.
- Levillain, A & Nguyen. H. (2017). *A lever for the circular economy: changing the status of waste: a comparative law study between Europe and Asia*. In Levillain & Nguyen, ouvrage collectif sur l'Economie Circulaire, Presse Universitaire de Provence, 77-88.
- MacArthur E. Foundation. (2016). World Economic Forum and McKinsey & Company. *The New Plastics Economy: Rethinking the Future of Plastics* (Ellen MacArthur Foundation, 2016).
- Milanez, B., Hargrave, J., & Luedemann, G. (2015). *Urban environmental services: valuing the environmental benefits of solid waste recycling in Brazil* Int. J. Environment and Waste Management, 15(1), 67-85.
- Mongtoeun, Y., Takeshi, F., & Sour, S. (2014). *Current status of commercial solid waste generation, composition & management in Phnom Penh city, Cambodia*. J. Environment and Waste Management, (1), 31-38.
- Ngo, K. C., & Pham, Q. L. (2011). *Solid waste management associated with the development of 3R initiatives: case study in major urban areas of Vietnam*. Mater Cycles Waste Management, 25-33.
- Nguyen, D., Huynh, T. H., & Keiichi, N. (2010). *A new approach for the evaluation of recycling system for electronic waste in Vietnam*. Vietnam Journal of Sci. Technology, 102-108.
- Omidiani, A., & Hashemi Hezaveh, S. M. (2016). *Waste Management in Hotel Industry in India: A Review*. Int. J. Sci. Res. Publ. (6), 670-680.
- Pham, P. S. T., Hoang, M. G., & Fujiwara, T. (2018). *Analyzing solid waste management practices for the hotel industry*. Global J. Environ. Sci. Manage., 4(1), 19-30.
- Pirani, S. I., & Arafat, H. A. (2014). *Solid waste management in the hospitality industry: A review*. J. Environ. Manage. (146), 320-336.
- Schneider, P., Le, H. A., Wagner, J., Reichenbach, J., & Hebner, A. (2017). *Solid Waste Management in Hochiminh City, Vietnam: Moving towards a Circular Economy*. Sustainability, (2). p286.
- Stahel, W. R. (2015). *The Circular Economy - A Wealth of Flows* (ed. Webster, K.) 86–103 (Ellen MacArthur Foundation, 2015).
- Stahel, W. R. (2006). *The Performance Economy* (Palgrave, 2006).
- Stahel, W. R. (2008). *Handbook of Performability Engineering* (ed. Misra, K. B.). Ch. 10, 127–138. Springer.
- Stahel, W. R. (2001). *Our Fragile World: Challenges and Opportunities for Sustainable Development Vol. II* (ed. Tolba, M. K.). Ch. 30, 1553–1568 (UNESCO/EOLSS, 2001).
- Thanh, N. P., & Matsui, Y. (2011). *Municipal Solid waste Management in Vietnam: status and the Strategic actions*. Int. J. Environ. Res., 285-296.

Tóm tắt:

KINH TẾ TUẦN HOÀN VỚI TÁI CHẾ CHẤT THẢI: TỔNG QUAN, THÁCH THỨC VÀ CƠ HỘI TẠI VIỆT NAM VÀ PHÁP

Kinh tế tuần hoàn (CE), cung cấp một sự thay thế tốt hơn cho mô hình phát triển kinh tế chủ lực, gần đây đã trở thành một khái niệm phổ biến trên phạm vi toàn cầu. CE nhằm mục đích tối đa hóa việc sử dụng hiệu quả tài nguyên để đạt được sự hài hòa hơn giữa các yếu tố kinh tế, xã hội và môi trường. Bài viết này sẽ trình bày tổng quan về CE với những áp dụng thực tiễn trong tái chế chất thải, cơ hội và thách thức của CE ở Việt Nam và Pháp.

Từ khóa: Kinh tế tuần hoàn, Giảm thiểu-tái sử dụng-tái chế, Tái chế chất thải, Việt Nam, Pháp.

Ngày nhận bài: 28/01/2019

Ngày chấp nhận đăng: 01/3/2019