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RESEARCH ARTICLE



## Co-designing workshops on sustainable consumption and production in Southeast Asia: application of idea cards and structuring methods

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### ABSTRACT

Ensuring sustainable consumption and production (SCP) patterns is an important task for achieving Sustainable Development Goal 12 by 2030. To facilitate international and domestic collaboration toward regional SCP, we developed a collaborative workshop method to generate and structure ideas about consumption and production (CP) patterns and employed the procedures for emerging Southeast Asian countries at workshops in Japan and Thailand. The main focus was on Bangkok, and the goal was to identify the implications of SCP policies. The structuring of seventeen SCP patterns chosen from 525 CP patterns generated at the workshops helped to identify the important influential factors, policy interventions, and features of probable SCP patterns. The main conclusions were the following: (1) The viewpoints of consumers and providers are important for idea generation. The products and services, as well as the systems of CP patterns, should be targeted; (2) Transition, improvement of the quality of life, and digitalization are also key directions of SCP patterns in Bangkok; (3) Culture, infrastructure, and industry are major considerations for regional SCP policy; and (4) SCP policy instruments are broader than conventional environmental policy instruments, and expanding the scope of SCP policy should be discussed more widely, especially in Asian countries.

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Co-design; policy planning; sustainability transition; Southeast Asia; Sustainable Development Goals (SDGs)

## Introduction

Ensuring sustainable consumption and production (SCP) patterns has been an important task for sustainable development since the Earth Summit in 1992 and the issue was designated as one of the Sustainable Development Goals (SDGs) in 2015. However, efforts to pursue SCP over the last thirty years have revealed that the task is not easy. In fact, making improvements toward SCP has become more difficult because many emerging/developing countries have increased their consumption and production of products and services. This difficulty is especially true in Asia, where economies have been growing rapidly. Academic articles about SCP have therefore increasingly begun to focus on emerging economies, especially in Asia (e.g., Tseng et al. 2016; Wang et al. 2019). However, according to the United Nations (UNESCAP 2019) progress on SDG 12 (Responsible Consumption and Production) in Asia and the Pacific has lagged behind advances on other SDGs in the region.

Because of the difficulties encountered, it has gradually become understood within the field of SCP that a collaborative approach is important. For example, a recent resolution of the United Nations Environment Assembly (2019) states that achieving SCP is only possible with the active support and participation of all stakeholders. Relevant is the work of Sedlacko et al. (2013) who have categorized three different processes by which knowledge becomes established in public policy: bureaucratic, managerial, and communicative formation. They have concluded that communicative formation – formation of knowledge in a way that takes into consideration the knowledge of citizens and local people and results from interactive, participative communication that takes a constructivist position with pluralistic understanding of knowledge – seems to be desirable for sustainable consumption. In emerging Asian countries, various stakeholders have engaged in SCP over the last decade. These individuals and organizations have ranged from Asian practitioners and scientists to others from the West

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such as international agencies, institutes focused on promotion of international cooperation, and multinational enterprises. For example, the SWITCH-ASIA program of the European Union has funded to date approximately 130 SCP projects across the region. Accordingly, it is important to consider collaboration not only between internal (national) stakeholders, but also external stakeholders from other countries.

Moreover, system transition, in which interactions and collaborations between actors are required, is acknowledged to be important and has been advocated by researchers from developed countries. Vergragt et al. (2014) have pointed out that systemic change is a main research area. Cohen (2019) has asserted that system innovation is necessary because contemporary provisioning systems are experiencing substantially suboptimal performance, exacerbating inequality and compounding ecological burdens. Geels (2015) has reviewed the concepts of SCP research and argued for a reconfiguration position in favor of systemic transition as opposed to conventional reformist and revolutionary positions. The reconfiguration position considers that consumption and production interact with each other and places importance on the interactions of actors. Many transition studies have been carried out in recent years (see the review by Köhler et al. 2019) and this work highlights how SCP policies in emerging economies tend to take a reformist position, to separate consumption and production, and to implement policies for consumption and production independently or with little interaction. For example, the SCP roadmap developed by Thailand (Government of Thailand 2017) for the period 2017–2036 divides the production and consumption sectors into separate spheres, as explained in the next section.

What could be a concrete approach for collaboration on SCP policy in emerging economies? One possibility is the practice of co-design which is a collaborative approach that has been developed in the field of product and service design and involves designers (i.e., producers, including providers) and people (i.e., consumers) not specifically trained in design working together from idea generation to prototyping and production (Sanders and Stappers 2008). Co-design fills the cognitive gap between designers and users to provide better ideas, more effective decisions, and higher user satisfaction (Steen et al. 2011). Another approach to collaborative formulation of SCP policy is the so-called “living lab” (European Network of Living Labs 2016). A living lab is a real-life co-creation for testing hypotheses and performing experiments in a space where users and producers co-create and pilot innovations. In these approaches, as argued by

Sanders and Stappers (2008), more attention should be paid to the front end of the process because of its chaotic nature and its significant influence on the process of subsequent traditional design. Moreover, consumption and production (CP) patterns do not necessarily apply to a single product or service. Joint framing of challenges (Mauser et al. 2013) and reframing of CP patterns to encompass more than a single product or service could greatly facilitate determination of what to design for SCP from a systemic perspective.

This article therefore focuses on the idea-generation phase of the process of designing and formulating new SCP patterns in emerging Asian countries to facilitate international and domestic collaboration toward a regional approach to SCP that overcomes gaps of knowledge and perception. Because few systematic collaborative methods have been developed for the idea-generation phase of this SCP process, we devised a workshop method as explained in the third section and employed the methodology at two workshops.

Prior studies have utilized a similar participatory process of idea generation to formulate SCP policies. For example, Mont et al. (2014) presented four scenarios for sustainable lifestyles in Europe in 2050, Tasaki et al. (2016) described similar scenarios for Japan in 2030, and Kishita et al. (2018) outlined SCP visions for Asia in 2050. Although these participatory methods seem to be effective in creating a variety of ideas about SCP, their focus has addressed broader social and lifestyle changes. These methods have not elucidated the components of the influential factors and goals of CP patterns or addressed policy interventions. In addition, many existing studies of future SCP patterns using workshop methods have targeted developed countries rather than emerging economies. Local and regional characteristics that are related to CP patterns (hereinafter, referred to as “local characteristics”) in emerging economies are still unclear. Transferring SCP policies to such countries in Asia could fail if they do not incorporate knowledge of local characteristics.

The objectives of this article are twofold. First, we aim to describe a method that could be used at workshops to generate ideas about SCP patterns in the future. Second, we seek to generate ideas about the directions of SCP policies in emerging Southeast Asian economies while taking into account local characteristics by employing the workshop method and comparing the results. This article starts with a description of current SCP policies advanced by the Association of Southeast Asian Nations (ASEAN), which are the countries targeted in this study and have similar economic characteristics, with a particular focus on Thailand.



## SCP policy in ASEAN countries and Thailand

The Association of Southeast Asian Nations (ASEAN) was established in 1967 and the organization currently encompasses ten members.<sup>1</sup> The *ASEAN Socio-Cultural Community (ASCC) Blueprint 2025* published in 2016 seeks to promote sustainable development across the region and puts forward SCP as one of five key elements. The document articulates four strategies for implementing SCP: public-private partnerships to adopt environmentally sound technologies for maximizing resource efficiency, environmental education, capacity building of relevant stakeholders for waste management and energy efficiency, and integration of SCP strategies and best practices into national and regional policies or as part of activities related to corporate social responsibility (CSR).

The concept of SCP has been integrated into the National Economic and Social Development Plans (NESDP) of Thailand.<sup>2</sup> The current Twelfth NESDP (NESDB and Office of the Prime Minister 2016) addresses the years from 2017 to 2021, and Article 3.4 of the NESDP states that to encourage SCP, it will be necessary to “place emphasis on managing resources efficiently and sustainability” under Strategy 4, “Strategy for Environmentally Friendly Growth for Sustainable Development.” The Ministry of Natural Resources and Environment took responsibility for SCP and, with other agencies, put forward an SCP roadmap for 2017–2036. The roadmap outlines policies for central, provincial, and local levels of governance and establishes sectoral targets that distinguish consumption and production sectors. According to Thongplew et al. (2017), the first phase of SCP policies over the last two decades focused primarily on upstream actors and production processes, and the second phase has extended attention to include downstream actors and consumption processes. In the various production sectors, a distinction is made between manufacturing, agriculture, and tourism. For the manufacturing sector, the priorities have been development of industrial production processes, certification of green industries (so-called “Green Industry Mark”), and waste management. Within the agricultural and food sector, reduction of climate change and pollution prevention have been the main foci and for the service sector the emphasis have been on the carrying capacity of green tourism. Green public procurement and eco-labeling (public and private sectors), green urban infrastructure (public and construction sectors), and education (raising awareness) have been the main foci of the consumption sectors.

Pollution prevention, including waste management and improvement of resource and energy efficiency in each sector, has been the main goal of the

existing SCP policies in Southeast Asia more generally. Achieving these goals will require the introduction of technology by producers and provision of information to consumers with the leadership of the government. The reformist position has prevailed in the region, and generation of collaborative ideas about new SCP patterns and policies have not yet drawn as much attention as they have in some European countries.

## Methodology

### General procedure

We used two modes in a two-phased workshop process: divergent and convergent thinking (Guilford 1967). During the first phase, we sought to obtain a variety of ideas about CP patterns in emerging economies by using divergent thinking. In a second phase, we then deployed convergent thinking to identify important influential factors and potential policy interventions for achieving CP pattern in these Southeast Asian countries. Preparation and facilitation of the workshop were based on general workshop-design methodologies articulated by Hori and Kato (2008) and Yamauchi et al. (2013). Specific and original aspects of our workshops are explained below.

### Method for idea generation of CP patterns

Idea generation is a creative process that uses acquired knowledge and inspiration based on divergent thinking. A variety of divergent thinking methods and approaches have been devised over the last few decades (c.f. Takahashi 2002) and they can be divided, broadly speaking, into two groups: 1) free-style idea generation such as brainstorming and 2) constrained idea generation such as morphological analysis. After considering the respective advantages and disadvantages of these methods, we decided to use the latter alternative because the former relies substantially on the ability of the individual participants while constraining can often inspire people to develop new ideas and to assemble them in innovative ways. Also, previous methodologies such as brainstorming are well established and have frequently been used. For example, Rotmans et al. (2000) relied on brainstorming to address important issues of European sustainable development and Kishita et al. (2018) brainstormed various ideas for SCP in Southeast Asia for the target year of approximately 2050. Therefore, of the two approaches, a sound case can be made for devoting attention to further developing the practice of constrained idea generation.



Constrained idea-generation methods typically let participants contemplate the consequences of co-occurrence of two different elements. We chose a human-activity domain (such as moving or eating) as an element and wrote possible options on cards as the other element.<sup>3</sup> That is, the role of the cards is stimulus for idea generation. We then allowed participants to think about what CP pattern might emerge in a specific activity domain in the near future. As possible options, we used the following eight directions of changing CP patterns:<sup>4</sup>

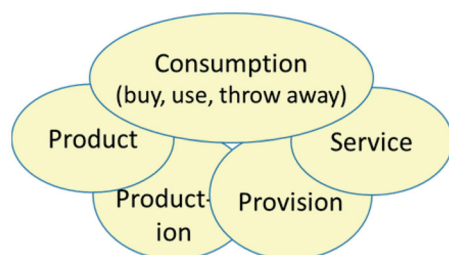
- Make an existing product/service green
- Fully use a product and its parts/materials (e.g., lifetime extension, repair)
- Make a new product/service to meet needs
- Change the use pattern of a product/service by using information
- Change the infrastructure or rules
- Use the function (e.g., sharing, servicing)
- Eliminate a product/service itself
- Change one's lifestyle/business practice

After this idea-generation step, workshop participants talked about CP patterns and selected one or two of the alternatives that were deemed most interesting in a given domain. See [Appendix A](#) for the exact eight cards and [Appendix B](#) for the detailed procedure of the first phase.

### Conceptualization of CP patterns

For the generation of ideas about CP patterns, clear conceptualization was necessary to avoid hindering subsequent group discussion. We thus defined a CP pattern to be the “totality (whole phenomenon) of consuming and living patterns with the use of products and services, and the associated subsystems of production, provision, consumption, and disposal/circulation for the products and services” as shown in [Figure 1](#) (“Production” includes not only manufacturing but also resource extraction and recycling (reproduction) and “consumption” includes purchase and disposal).

For example, the conventional meaning of the CP pattern of a “car society” consists of, inter alia, automobile products and maintenance services as well as



**Figure 1.** Components of a CP pattern.

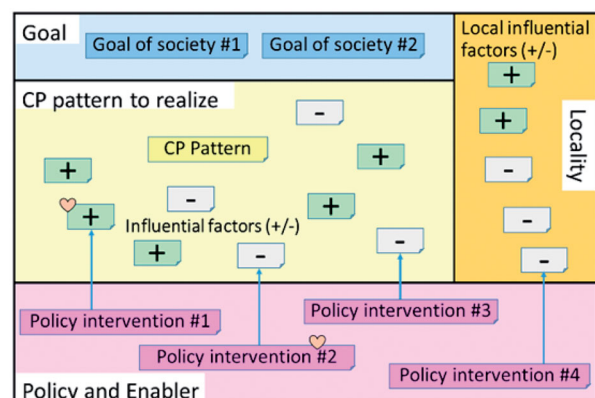
the lifestyles associated with car ownership and use, car manufacturers, car dealers, and car-insurance companies. The CP pattern of car sharing includes shared cars and their maintenance in addition to car-sharing lifestyles, car manufacturers, and sharing providers.

### Method for structuring of CP patterns

In the field of policy science, Simon (1973) distinguished two different problem structures that he described as well-structured and ill-structured (or wicked). In short, well-structured problems can be defined and solved by systems-analysis approaches, whereas ill-structured problems are complex and include multiple goals and multiple stakeholders. That complexity prevents policy makers from addressing ill-structured problems by deploying approaches that are similar to the ones they use for well-structured problems. Miyakawa (1994) has asserted that structuring a problem links directly to finding a solution to the ill-structured problem. The more ill-structured a problem is, the more time it will require to understand the structure. Moreover, some people are unlikely to reach the same understanding of the structure if it is very ill-structured. Understanding ill-structured problems in a more organized way therefore helps to reduce misunderstanding and to find a solution.

Issues of SCP include multiple elements (as explained in [Figure 1](#)) and multiple goals on the consumption and production sides as well as environmental and sustainability goals. In addition, multiple stakeholders are involved in an SCP pattern. Accordingly, SCP can thus be regarded as an ill-structured problem, and structuring is supposed to contribute to the discovery of a solution and to provide a means of communication among different stakeholders.

We therefore devised a structuring sheet with four sections, as shown in [Figure 2](#). Three sections describe three relationships between an SCP pattern



**Figure 2.** Devised SCP structuring sheet.



and its goals, between the SCP pattern and factors, and between the factors and interventions.<sup>5</sup> The fourth section distinguishes local factors from non-local factors, a distinction that is important and unique for the method because SCP in emerging Asian economies may involve factors different from those in Western countries.<sup>6</sup> To identify such local characteristics would help both local and foreign practitioners to design, to adjust, and to achieve a certain SCP pattern. The sheet is used to enable participants to discuss (1) the intermediate or ultimate goals of an SCP pattern, (2) the factors that influence the SCP pattern, with a distinction between local and non-local factors; and (3) potential policy interventions to achieve the SCP pattern. See [Appendix B](#) for a more detailed description of the procedure for the second phase.

### Application of the methods at the workshops

We implemented these methods at two workshops on Southeast Asian SCP. The first workshop was held in April 2019 in Hayama, Japan (hereinafter referred to as the “Japan WS [workshop]”). The Japan WS was a preliminary workshop to validate the research protocols. Because it was our intention to obtain external (non-local) opinions about SCP in an area, the invited participants were Japanese academics and a few non-Japanese academics, all of whom were working in Japan in the field of Asian SCP. We organized the 29 participants into five groups (each with 5–6 members) and endeavored to avoid bias with respect to the gender and length of research career of the participants. Each group chose a geographic area from a Southeast Asian country (three selected Bangkok, one selected Hanoi, and one selected Kuala Lumpur and Bangkok). We allocated activity domains to each group – cooling, doing housework, eating, moving a short distance, and working.

The second workshop was held in October 2019 in Bangkok, Thailand (hereinafter referred to as the “Thai WS”), the city-region that a majority of the participants had targeted during the first event. The second workshop was intended to enrich ideas by incorporating both internal (local) and external (non-local) opinions about SCP in Bangkok.<sup>7</sup> We therefore invited 51 participants from both Thailand and Japan. The Thai participants included academics (43%), government officials (19%), university students (10%), and members of the business community and environmental nongovernmental organizations (8%). The non-Thai participants were academics who had attended the first workshop (19%). We created seven groups (each with 6–9 members). There were six mixed groups (mainly

Thai, but including two Japanese, all of whom spoke English) and one Thai-only group (because they spoke only Thai). Each of these seven groups discussed one of seven activity domains (two activity domains, purchasing and tourism (traveling), were added to the five domains of the Japan WS, and the Thai-only group discussed tourism).

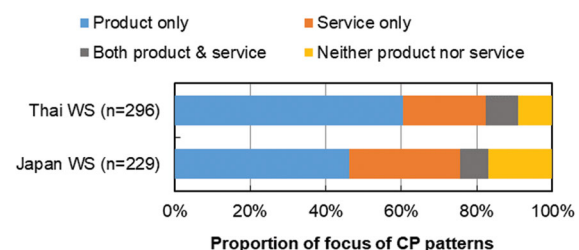
The idea-generation session lasted for approximately 75 minutes, and the structuring part of the event had a duration of approximately 100 minutes. Subsequently, the results were shared and discussed among the various groups. To avoid misunderstandings, participants were allowed to check the Internet for references.

## Results

### Generated ideas of CP patterns

In total, 525 ideas for CP patterns in Southeast Asian cities were generated through the work of the idea-generation groups (ideas that were explicit policy interventions or too vague for CP patterns were excluded). We counted the words used for the 525 ideas. Words used frequently to describe CP patterns included “reduce,” “use,” and “sharing,” as well as “product,” “service,” and “waste” at the Thai WS. At the Japan WS, they included “sharing,” “use,” “reduce,” as well as “service” “energy,” “system,” and “time” (see the word cloud of the CP patterns in [Appendix C](#)). Words of actions were the same at the two workshops, but words of objects differed.<sup>8</sup> In addition, the participants paid differing levels of attention to the five components of CP patterns ([Figure 1](#)).

To understand these differences, 525 ideas of phrases (not each word) were categorized by target, theme, and actor. [Figure 3](#) shows that product-oriented CP patterns such as eco-products and energy-saving products received the most attention at the Thai WS. At the Japan WS, more attention was paid to “service” and “neither product nor service,” which included use of time and infrastructure. Thongplew et al. (2017) have pointed out that the first phase of SCP policies in Thailand focused primarily on production processes. The history of SCP policies in a country could therefore affect the



**Figure 3.** Categorization of CP patterns of Southeast Asian cities (mainly Bangkok).



results of collaborative workshops as a result of the different perceptions of participants about SCP. Refer to [Appendix D](#) for the results of the thematic categorization. The card used most frequently at both workshops was “Change one’s lifestyle/business practice.” The next most frequently used cards were “Make an existing product/service green” at the Thai WS and “Change infrastructure or rules” at the Japan WS (see [Appendix E](#) for details). Again, different amounts of attention were paid to products and systems.

The results of another categorization based on actors were very similar at the two workshops: “provider” was mentioned most frequently (35–36%), followed by “consumer/users” (25–32%), “producer” (20–21%), and “overall system” (11–19%). This result indicates that it was easy for participants to generate ideas for CP patterns from the perspective of consumers and providers. The “overall system” category included infrastructure, rules, lifestyles, and working styles. The extent of taking a systems perspective varied between the two workshops.

### **SCP patterns selected for structuring**

Among the 525 ideas for CP patterns (including patterns suggested by several members), seventeen of them were structured at the workshops. [Table 1](#) shows the SCP patterns, their goals, and important factors (see [Appendix F](#) for the full table, including policy interventions and remarks). Key points of these SCP patterns, and implications for practitioners and scientists who engage in SCP policies in emerging Southeast Asian economies, including those from other countries, are as follows.

In the activity domain of “cooling,” two SCP patterns addressed infrastructure issues such as housing, building, and city planning. To date, ASEAN countries, including Thailand, have set minimum energy-performance standards (MEPS) and implemented labeling of air conditioners with respect to energy efficiency.<sup>9</sup> More attention to infrastructure, rather than products, was expected to save energy, an approach advocated by the International Energy Agency (IEA 2019) and previous studies.<sup>10</sup> The participants at the Thai WS were more focused on educational and behavioral approaches to environmental issues.<sup>11</sup> Hori et al. (2013) investigated the determinants of household energy-saving behavior in five Asian countries, including Thailand, and pointed out, for example, that a considerable level of global warming consciousness did not promote energy-saving behavior. In other words, an exclusively educational approach has limited positive influence and needs to be complemented by other

policy instruments. In contrast, participants at the Japan WS paid more attention to comfort, which is another way of describing quality of life (QoL). Shove et al. (2010) collected various studies and views of Western researchers on contextual studies of thermal comfort for a lower carbon society, which could be a basis for incorporating comfort into SCP policy in emerging economies. Zhang et al. (2017) revealed that rural people in Thailand who preferred to stay outside of their houses rather than use air conditioners were happier than those who preferred to stay inside. This kind of regional insight is relevant for investigations because practices often associated with modernization and westernization, and typically consume more energy, do not necessarily improve the standard of living of people. This insight could be useful in helping to identify alternative SCP patterns in a region. The third SCP pattern in “cooling” addressed use of natural conditions (i.e., using rain for cooling) as well as a lifestyle change from product possession to use (sharing). Researchers such as Ishida and Furukawa (2013) have studied technologies that use natural conditions or mimic nature and described them as forms of “nature technology.” More attention to such approaches could contribute to new, innovative SCP patterns.

Three SCP patterns in the domain of “housework” addressed QoL in terms of two goals: a reduction of household chores and a lowering of environmental loads. The ways to enhance QoL were professional services, outsourcing, and technology, all of which connoted business opportunities. Three SCP patterns in the domain of “eating” also addressed the same two goals: QoL with respect to health and safety and reducing environmental loads associated with, for example, food waste. Current SCP policy in Thailand reflects conventional environmental policy and is expected to integrate QoL and business development. Among these SCP patterns, local business conditions have been regarded as important factors. For instance, street-food vendors are popular in Bangkok as well as throughout Thailand more generally and these services provide critical benefits especially to lower income people. According to Khongtong et al. (2014), Thai consumers are attracted by the cheap price of food purchased from these vendors (which can be a quarter of the price paid in restaurants) and to their convenience. However, enforcement of regulations in Thailand was regarded as weak in terms of controlling them.<sup>12</sup> Improvement of food safety and providing healthy food was not, therefore, an easy task. In the case of “housework,” the absence of a requirement for a license to become a housekeeper enables workers with little education to access



**Table 1.** Seventeen SCP Patterns of Southeast Asian Cities (mainly Bangkok) Suggested at the Two Workshops.

WS	CP Pattern	Goal of CP Pattern (Intermediate/Ulimate)	Important Factor (+: Promoting Factor; -: Hindering Factor; Local Factor(s) Underlined)
Cooling BK	Smart infrastructure to bridge gaps between behavior and awareness	Low-carbon, green/energy-efficient products, cheap energy cost, high awareness of the environment	Cheap and non-green products (-), people consider cost more than environment (-)
JP	"Cool" cooling – cities designed toward comfort and addressing apparent temperature	Decrease apparent temperature down to 28°C	None
JP	Cooling outside – lifestyle change and space-sharing	Emphasizing low-carbon lifestyles and comfort	<u>Excessive cooling habits (-)</u>
Doing housework BK	Professional green housekeeping service for sustainable quality of working life	Expanding green job and green service market, achieving zero-emission society, improving quality of life	Developed standard of services (+), no license to become a housekeeper (+), reasonable price of service (+), mobile application that easy to use (+), housekeeping training program (+), low education level of housekeepers (-), lack of privacy (-), expensive service (-)
JP	Cooking Outsourcing for Health And Sustainability (COHAS)	Improvement of social capital and health	Delivery service (+), high energy-efficient cooking (+)
JP	Efficient housework by technology introduction	Decoupling of environmental loads and well-being	Introduction/replacement of energy efficient products (+)
Eating BK	Eating Healthy (Quantity/Quality) and Sustainability	Food-waste reduction, promoting health, minimizing carbon footprint and resource use	Variety of choice of tasty food and creative chefs (+), meat and flavor addition (-), difficulty of controlling street-food vendors and safety issues (-)
JP	Zero-waste food society	Reduction of food loss and realization of self-sufficiency and safety of food	<u>Eating-out culture (+), mom's cooking (-)</u>
JP	New eating culture with artificial foods	Balancing environmental consideration with food risk and security	Industrial creation (+), people's social acceptability (-)
Moving in a short distance BK	Online and apps platforms (e.g., e-learning, teleworking, online shopping)	Minimizing unnecessary activities, minimizing emission, better quality of life	Culture to adopt new technology/innovation (+), familiarity of informal transport (+), no motivation for organization (-), consumers' mindset (-)
JP	Society with high connectivity between walking, cycling, and public transportation	Simultaneous achievement of the reduction of air pollution/traffic congestion, carbon-free society, and health promotion	Undeveloped transportation infrastructure (-)
JP	Hub-office and distributed telework	Simultaneous achievement of the reduction of air pollution/traffic congestion and carbon-free society	Existing system placing emphasis on face-to-face communication (-)
Purchasing and delivery BK	Digitalized online-purchasing platform	Increasing efficiency of resource/energy consumption, decarbonization, accessibility to good service for everyone, generating employment with a new mode of economy	<u>Adaptability of the local shops to join (+) familiarity with no material consumption (+), a green consumer for repair/reuse (+), too much packaging (-), not so-trustworthy online platform (-), lack of digital literacy (-), increase in the number of delivery trips (-)</u>
Tourism (travelling) BK	Responsible tourism	Sustainable benefits to the environment, social and well-being for host country/area	<u>International regulation enforcement (+), insufficient budget (-), language barrier (-), local waste management system (-)</u>
Working BK	Remote working, online meeting and Internet of Things	Improving productivities, improving quality of life and work balance, promoting green society, decarbonization	New generation's life (+), <u>education in equality (-), lack of enforcement law (-)</u>
JP	Telework	Reduction of transportation and emphasis on quality of life/work (QoL)	Business outsourcing to foreign countries (+), <u>platform in local languages (-), mental conditions such as loneliness (-), old-fashioned management (-)</u>
JP	Co-working at shared offices	Reducing moving distances and realizing quality of work (creativity)	Demand for local work (+), benefits of office networking (+), mutual assistance (+), <u>confidential information management (-), lack of morals (-)</u>



employment, but it hinders the provision of professional, green housekeeping services.<sup>13</sup>

SCP patterns in “moving a short distance,” “purchasing,” “tourism,” and “working” were closely interrelated because all of them are associated with the movement of people or products. Digitalization and virtual platforms play significant roles in these activity domains. E-learning, teleworking, and online shopping, for example, reduce the movement of people and also lower associated energy consumption and greenhouse-gas (GHG) emissions. Potentially, these SCP patterns not only benefit the environment but also provide personal benefits to consumers and business opportunities to providers. Ackaradejruangsri (2015) revealed that passengers and drivers use the most popular ride-hailing service (Grab) in Bangkok because of its convenience, comfort, more options to choose a job, and multiple route options. Participants in the Bangkok WS considered the social acceptance of these technologies, which is an important condition for realization of SCP patterns, to be high in the Thai city. In particular Thai participants mentioned that people in Bangkok are familiar with informalities, especially informal transport (e.g., motorcycle taxis and tuk-tuks), and mobile application of ride-hailing services were quickly adopted. They also regarded the lack of availability of virtual platforms in local languages to be an important constraint on implementation.

Workshop participants highlighted the negative consequences of teleworking, such as intensification of social isolation, competition in the labor force, and degradation of the quality of work.<sup>14</sup> Two SCP patterns thus presented a middle-of-the-road scenario between working completely at the office or at

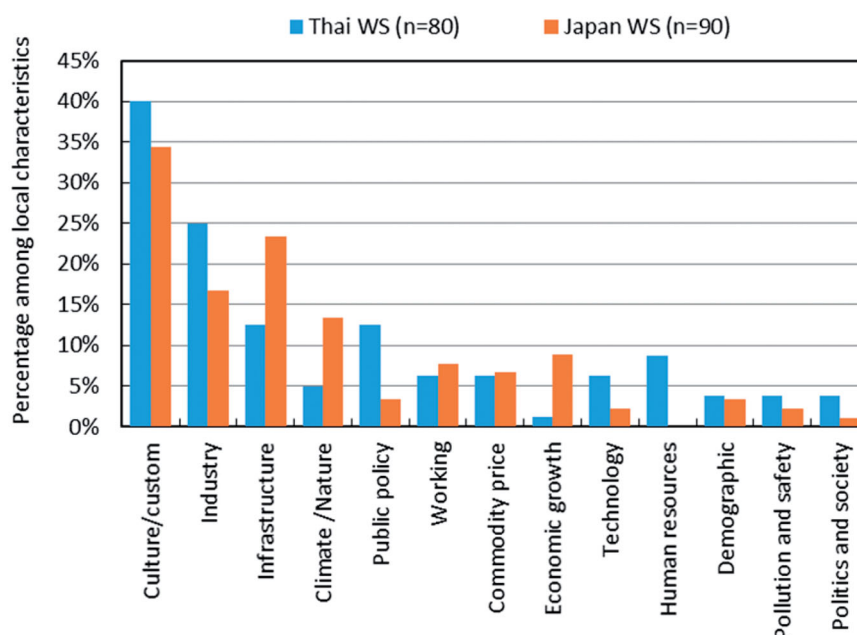
home. They suggested that “co-working at shared offices” and “working at a hub office in a distributed office system” could promote creativity and reduce travel distances.

SCP patterns in “moving” and “tourism” addressed infrastructure, but not its quantity. Workshop participants paid attention, respectively, to the connectivity between transportation modes and the creation of zones for tourism, which are regarded as aspects of infrastructural quality.<sup>15</sup> As was apparent in the activity domain of cooling, the housing infrastructure needed in the future is not just the mere number of houses but rather also needs to include effective insulation and efficient ventilation and/or with a room or space for teleworking. Infrastructure development must evolve to enable SCP patterns that people deem desirable.

### Local characteristics identified

Figure 4 shows the categories of 170 local characteristics that were identified in the structuring of the seventeen SCP patterns.<sup>16</sup> Workshop participants most frequently referred to the categories of “culture/custom,” “infrastructure,” and “industry” and included the following examples.<sup>17</sup>

- *Culture/custom*: Habits, common behaviors and perceptions, collective preferences observed in an area such as the role of wife as “good cook, good housekeeper,” relaxed attitude about time, trust among neighbors, familiarity with informal transport, and setting temperatures too low.<sup>18</sup>
- *Industry*: Existing industries and businesses, emerging businesses, inter-firm competition,



**Figure 4.** Local characteristics that were identified at the workshops as characteristics that influenced SCP patterns. Note: categories are placed in descending order of their total number from left to right.



supply chains, and distribution systems such as the existence of street vendors, opening hours, and monopolistic situations.

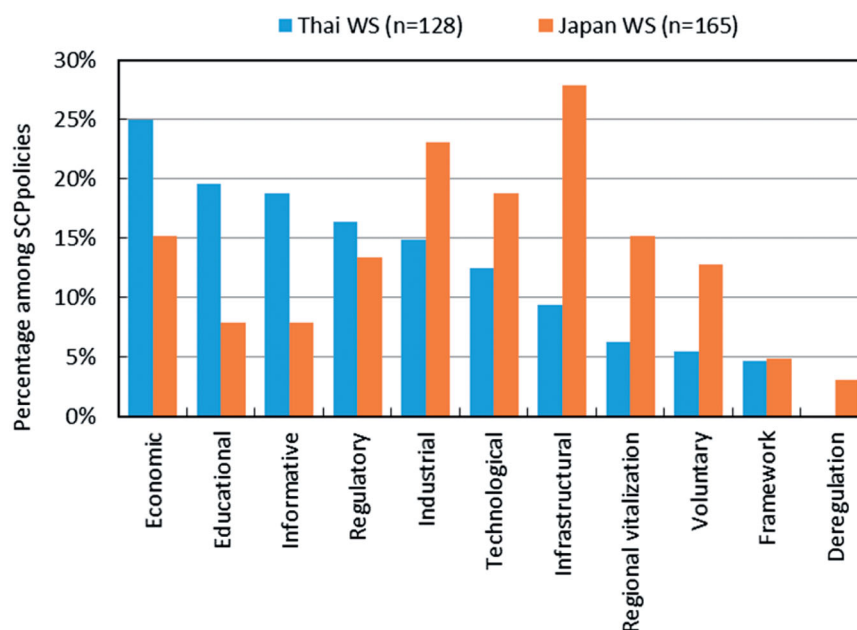
- *Infrastructure*: not only conventional kinds of infrastructure (e.g., road and waste-collection system) but also alternatives able to support new CP patterns and lifestyles (e.g., roads for specific purposes such as walking and bicycling, energy-efficient and comfortable residences, open public spaces, and digital infrastructure such as online platforms and digital currency).

The differences of the profiles in Figure 4 suggest which local characteristics are likely to be taken into account or neglected by local and non-local (external) stakeholders, respectively, who engage in SCP patterns. The Japan WS did not include local participants, and therefore the higher orange bars in the graph indicate categories that non-local stakeholders can be easily perceive. “Infrastructure,” “climate/nature,” and “economic growth” were among these categories. The other local characteristics, especially the categories with relatively high blue bars in Figure 4, are apt to be disregarded by non-local stakeholders. Another interpretation of Figure 4 is that these three categories – infrastructure, climate/nature, and economic growth – are so obvious or prevalent in an area that their importance is difficult for local stakeholders to realize or express in a dialogue about SCP patterns.

### SCP policy intervention obtained

We assigned the 293 SCP policy interventions suggested at the workshops to different categories

(Figure 5). In the Thai WS, the instruments used the most for SCP patterns were economic, followed by educational, informative, and regulatory; in other words, conventional environmental policy instruments. These four instruments received less attention at the Japan WS than they did at the Thai WS (Figure 5). At the Japan WS, infrastructural, industrial, and technological policies were deemed most relevant, followed by policies for regional vitalization and voluntary activity. Except for the voluntary instrument, these interventions are not conventional environmental policies. The results of the Japan WS suggested that SCP policy for changing CP patterns needed to go beyond conventional environmental policy instruments, but the results of the Thai WS suggested that conventional environmental policy instruments were still important in Bangkok. Given the rapid economic growth of Asia, both industrialization and de-industrialization, as well as modernization and post-modernization occur simultaneously. Whittaker et al. (2010) have referred to this phenomenon as “compressed development” and argued that it will be necessary to stretch policies to address multiple “stage” challenges during a time of such rapid development.<sup>19</sup> The PECoP-Asia (2018) report has also pointed out that SCP policies have been expanding from the domain of environmental policy to the domain of socioeconomic technology such as infrastructure building and capital formation, including social welfare, business development, local development, and innovation. Addressing both conventional and new policy approaches, or a mix of them, will be an important challenge for SCP policies in Bangkok and presumably throughout most of Southeast Asia.



**Figure 5.** Type of SCP policy instruments suggested at the workshops. Note: categories are placed in descending order of their percentage of responses at the Thai workshop from left to right.



### **Feedback from participants about the methodology**

We received feedback from several participants after the two workshops. With respect to idea generation, they reported that the cards worked well; however, a few participants pointed out that it was difficult to choose an SCP pattern for the next step of the structuring. Choosing two or three SCP patterns makes the choices easier for participants and also leads to conversations about the relationships between SCP patterns that could result in even more interesting discussions.

With respect to structuring, participants valued dialogues about local characteristics because they thought that the interactions enriched the discussion about CP patterns in a target area. A few individuals mentioned that exchanges between locals and non-locals (i.e., Thai and non-Thai) were important because they were able to understand the other's view. The fact that different degrees of attention were paid across the categories of local characteristics (Figure 4) was also evidence of the significance of such discussions.

Several misunderstandings by the participants were noted at the workshops. A number of issues raised during the structuring discussions were not factors but rather policy instruments and therefore excluded from our analysis. For example, "environmental tax" is a policy instrument and not a factor in the workshops. Factors are those influencing (promoting or hindering the formulation of a CP pattern. "Low income," "punishment," or "economic incentive" in a general sense are factors. In addition, a few participants seemed to confuse factors with consequences. For example, "doesn't change regular drastic behavior" seemed to be a consequence of a CP pattern. These misunderstandings were not inherent to the method itself but to the complex nature of CP patterns. More explanation before the groups began their work or more comprehensive facilitation would have helped to avoid this situation.

One participant argued that an SCP pattern that was discussed might cause negative consequences (side effects). Another individual pointed out that unexpected events that might hinder an SCP pattern could happen. For example, participants believe that a CP pattern brings environmental benefits; however, the CP pattern could cause rebound effects later [e.g., Khazzoom (1980) and Madlener and Alcott (2009)] or could worsen social problems in the supply chain of relevant products and services. The coronavirus is a good example of an unexpected event that was beyond the scope of most people but ultimately proved to be a significant and influential factor. Incorporating these issues into the

methodology of the workshop remains a task for the future.

Furthermore, one participant pointed out that the method we developed could expand the field of SCP dialogue between practitioners and stakeholders. Another individual mentioned that in a hierarchical society like Thailand, where people attach importance to seniority, the workshop method provided an opportunity to exchange opinions between different demographic groups, such as those comprising older and younger individuals.

### **Discussion about SCP policy implications for emerging Asian economies**

We turn our attention in this section to a summary of several important observations with respect to SCP policies in the emerging economies of Southeast Asia.

First, the workshops revealed that the viewpoints of consumers and providers could be sources of new ideas. Exchanging perspectives among a diverse group of people, from outside an area, and beyond a country can be beneficial from the standpoint of generating novelty and innovation. A clear image of a product or service was an important stimulus for nascent thinking, but the significance of looking at infrastructure and rules as enablers of a system of CP patterns should not be neglected. The results of the two workshops showed that participants paid varying levels of attention to the components of CP patterns, especially to products and systems. It is important to keep in mind that some individuals had a narrow scope in understanding a CP pattern and did not even show interest in looking at its diverse aspects. Experiential (non-materialistic) consumption and conceptions of a circular economy were also good triggers to generate ideas of CP patterns, as shown in Appendix E. Alternative technologies with which many people are unfamiliar, such as nature technology, could usefully broaden conceptions of CP patterns.

Second, we can summarize the important features of the seventeen SCP patterns that were discussed as follows:

- SCP patterns presumed engagement with multiple socioeconomic and environmental goals, including QoL.
- SCP patterns through digitalization were commonly suggested and offered a popular direction.
- Ensuring SCP patterns requires a system transition rather than individual behavior changes or product changes. These transitions might include transformation of product stock and



**Table 2.** Distinction between elements of SCP patterns for policy expansion in emerging economies.

	New	Conventional
Infrastructure	Infrastructure for new SCP patterns and new lifestyles (e.g., roads for walking and biking, online platforms)	Infrastructure for production and waste treatment (e.g., roads, electricity, waste collection systems)
Technology	Artificial intelligence, virtual reality, digitalization	Eco-products (e.g., energy-efficient)
Industry/business	Instruments are the same, but for new industries/businesses that support new SCP patterns (e.g., green/social businesses, online businesses)	Promotion, subsidization, licensing, standardization
Local activity	Aim is regeneration of an area and community activities	Aim is economic development of an area

infrastructure as well as changes of prevailing tacit rules in an area.

- Social acceptance plays an important role, especially for technology-oriented SCP patterns.

In some developed countries, there have been robust discussions to date regarding sustainability transitions – improvement of both QoL and environmental performance – and digitalization has frequently been highlighted in the context of SCP. The results discussed in the previous section, particularly those that targeted Bangkok, covered a number of similar issues.

Third, culture and local customs, existing industries and businesses, and infrastructure were major local characteristics that contributed to SCP policy and action (Figure 4). There is important reason to be cautious about transferring SCP interventions from one area/country to another or introducing them without addressing these considerations. However, assessing such local characteristics is not an easy task. Sharing and understanding of relevant issues beyond an area/country, and providing opportunity to exchange opinions, should be considered by scientists and practitioners.

Finally, SCP policy instruments are broader than conventional environmental policy instruments (Figure 5). Expanding the scope of such strategies should be discussed more extensively by SCP policy makers in regions such as Southeast Asia. Due to limitations with respect to policy resources, such economies may not be able to address the conventional and new policies for the time being. Even so, formulating a long-term vision should play an important role, especially in the implementation of SCP policy. Thus, it is important to maintain a distinction between what is conventional and what is new. Table 2 highlights the main differences based on the results of the workshops. A transition to SCP patterns thus requires a redefinition of “infrastructure development” and “industrial policy” as well as introduction of new technologies based on the well-being of people.

## Conclusion

We developed a workshop method to identify SCP patterns and employed it at two workshops that were held in Japan and Thailand and mainly targeted Bangkok. The events generated ideas for 525 CP patterns, and seventeen of them were structured to extract relevant elements (i.e., goals of the society, 170 local factors, and 293 policy instruments). The method we developed consisted of constrained idea generation and structuring and this approach was found to be useful for stimulating SCP dialogues involving workshop participants with different backgrounds.

We identified three implications for practitioners and scientists regarding the implementation of SCP policies in rapidly growing Southeast Asian countries. First, sustainability transitions, improvement of both QoL and environmental performance, and digitalization offer important opportunities for SCP patterns in Bangkok and elsewhere. Second, culture and customs, existing industries and businesses, and infrastructure are major considerations for the design of regional SCP patterns and policies. Finally, SCP policies involve broader considerations than conventional environmental policy instruments, and expanding the scope of SCP policy should be discussed by policy makers more in Thailand and emerging economies that are experiencing compressed development. This larger focus is especially relevant when both industrialization and de-industrialization, as well as modernization and post-modernization, occur simultaneously.

This article raises the need for future research along two different lines. First, there is a need to convene workshops with more diverse stakeholders and/or in different locations to identify country-specific or regional characteristics of SCP patterns. Second, it would be instructive to link the idea-generation phase to subsequent phases, such as sustainability assessments of an envisioned SCP pattern. One possible avenue could be to develop a prototype in a living lab and to formulate detailed



policies for its implementation. While discrete studies and activities for these subsequent phases exist in some locales, it could be more effective to demonstrate the full process to SCP practitioners as they are not necessarily familiar with co-design approaches, especially in Asian countries.

## Notes

1. The current members of ASEAN are Brunei Darussalam, Cambodia, Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam.
2. According to Merle (2017), Thailand is a frontrunner of SCP practices in Asia and has implemented a variety of SCP policies.
3. An alternative for an activity domain could be a specific product or service; however, this choice would fail to foster thinking about new CP patterns in a sharing economy and with respect to product-service systems. In addition, Lifset (2000) pointed out the importance of focusing on consumer needs and product function rather than a product itself. Vergragt et al. (2014) placed values/needs linking consumption and production at the center of consumption and production system. We therefore chose activity domains, presuming that people try to satisfy their needs in a domain by using products and services, and we attempted to urge participants to consider people's needs beyond the specifications of existing products or services.
4. The eight directions of changing CP patterns were derived and simplified from the twelve opportunities for accelerating SCP in Asia and the Pacific region: (1) Experience matters, (2) Genuine wealth, (3) Environmental policy trends, (4) Circular economy, (5) Sophisticated information provision, (6) Design for local needs, (7) Digitalization technologies, (8) Sharing, (9) Infrastructure for SCP, (10) Tacit rules, (11) Indigenous wisdoms, and (12) Enhancing collaboration. For the full explanation, see PECoP-Asia and APRSCP (2018). PECoP-Asia is a research project on SCP and APRSCP is a network institution in Asia for SCP.
5. This approach is similar to a logic model in evaluation study (cf., Hatry 1999). Both concepts are based on the idea that visualization of the logic helps to check the accuracy and facilitates understanding as well as communication.
6. There are several studies comparing Western and Eastern cultures (e.g., Kosaka 2008). Koren (1994) pointed out differences between the modernized Western thinking and *wabi-sabi*, an Eastern way of thinking. It respectively contrasts logical and intuitive, absolute and relative, mass-produced and one-of-a-kind, faith in progress and no progress, control of nature and uncontrollability of nature, and adapting to machines and adapting to nature.
7. In our workshop preparation, we learned that it was difficult to realize local characteristics about SCP patterns with just internal (local) participants. We therefore invited both internal and external participants to join the events.
8. Words of action here are verbs or nouns that can become verbs. Words of objects are the other nouns.
9. Policy development exists not only in each country but also in regions. The project ASEAN SHINE (2015) facilitated harmonization of test methods and MEPS for air conditioners in the ASEAN region.
10. Sahakian (2014) and Yoshida et al. (2020) have discovered poor insulation and air tightness of houses in the Philippines and Thailand, respectively, based on their household surveys. Although the efficiency of air conditioners in Thailand has improved greatly, the poor energy performances of houses lock in the need for higher levels of electricity for cooling. Yoshida et al. (2020) has also concluded that environmentally friendly lifestyles should be promoted to control overuse of air conditioners, particularly by young people.
11. There have been many pro-environmental behavioral studies in both developed and developing countries. For reviews of this literature, see Steg and Vlek (2009) and Kurisu (2015).
12. Trafialek et al. (2018) have revealed non-compliance with respect to recommended food hygienic practices in four countries, including Thailand.
13. At the workshops, there was little discussion about migrant domestic workers (housemaids). Thailand is a major receiving country for such workers from neighboring countries. According to Rattanapan (2015), they are a cheap labor force and hard working, whereas Thai domestic workers are scarce and charge higher prices. Most migrant domestic workers do not have work permits.
14. Another concern is that a large, dominant platform could reduce market competition. Ramaiah et al. (2019) have argued for merged control of platforms in ASEAN countries from the viewpoint of competition law.
15. Narupiti (2019) has searched for a prospective provider of a more integrated mobility-as-a-service (MaaS) in Bangkok and concluded that establishment of digital infrastructure, which enables improvement of connectivity, was the first priority.
16. Some characteristics were assigned to more than one category.
17. Kawabata (2005) attempted to extract local characteristics (context) of retail businesses in Southeast Asia, including climate, race/population, religion, market distribution, history, policy, and income. These are covered by the categories in Figure 4 in a sense, although there are slight differences in the choice of words. For example, "history" might seem to be the most uncommon local characteristic that is least common between our categories and Kawabata's, but we posit that it should be related to all of the categories, i.e., cultural history, industrial history, and policy history.
18. Many studies have been carried out to identify cultural differences of countries. Inglehart (1997) and Hofstede (2001) are well-known examples of this kind of work. Because SCP patterns discussed here are future patterns, the characteristics of a country identified by this study may differ over time.
19. In other words, conceptually, there are different stages of economic development such as the traditional stage, the take-off stage, and the maturity stage. Contemporary emerging or developing economies typically implement policy instruments/approaches from different stages because they face different kinds of policy challenges at the same time due to their



rapid and oftentimes uneven development. Hence, these economies have to “stretch” policies to reach situations that they will encounter at a future stage.

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## Appendix A

### SCP Idea-Generation cards used at the workshops

The eight cards used for idea generation of consumption and production (CP) patterns at the Thai workshop are shown below. At the Japan workshop, cards written in Japanese were used. (Anyone can use the cards under the creative commons condition of CC BY-SA: <https://creativecommons.org/licenses/by-sa/2.0/>.)



Figure A1. Eight idea-generation cards used at the workshops.

## Appendix B

### Procedures of workshop method

The following procedures were adopted by every group at the breakout sessions of the two workshops.

#### First phase: idea generation of CP patterns

1. The target area from Southeast Asian cities and the activity domain to examine are determined/confirmed.
2. Each group member takes a few (generally two or three) cards pertaining to SCP idea generation and brainstorms as many as possible consumption and production (CP) patterns in the direction that the card states. Each CP pattern and the card number(s) used are written on a sticky note.
3. Group members paste the sticky notes on a sheet and explain them in turn. The participants exchange ideas and ask questions to understand these ideas more thoroughly.



5. One or two important CP pattern(s) is(are) chosen from the sheet as SCP pattern(s).

## Second phase: structuring CP patterns

1. A CP pattern chosen in the first phase is written on a yellow sticky note and the note is pasted in the yellow area of the structuring sheet (Figure 2).
2. The goals of the society developing the CP pattern are written on white sticky notes and pasted in the blue area.
3. Factors that promote the CP pattern are written on green sticky notes and the factors that hinder the patterns are written on gray sticky notes. Local factor notes are pasted in the orange area. Other non-local notes are pasted in the yellow area.
4. Individual policies and enablers (e.g., technology, platforms) for the above CP pattern are written on pink sticky notes and pasted in the pink area. Arrows are drawn to indicate where policies and enablers provide influence.
5. A couple of key factors and key policies are identified and marked for discussion.

## Appendix C

## Word clouds of CP patterns



**Figure C1.** Word cloud of CP patterns in Bangkok, Thailand, derived at the Thai Workshop.





Figure C2. Word cloud of CP patterns in Bangkok, Hanoi, and Kuala Lumpur derived at the Japan Workshop.

## Appendix D

### Thematic categorization of 525 CP patterns derived at the workshops

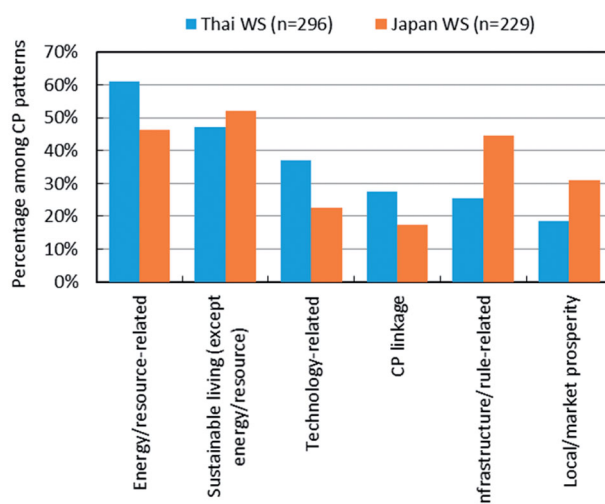


Figure D1. Categorization of CP pattern ideas from Southeast Asian cities (mainly Bangkok).



## Appendix E

### Analysis of Idea-Generation cards used frequently at the workshops

Table E1 shows the number of cards used for the idea-generation phase at the two workshops. In most cases, the cards of “Change one’s lifestyle/business practice” and “Change infrastructure or rules” were used most often. The idea-generation process was suitable for discussing large changes of CP patterns because the cards with large changes in a lifestyle, business practice, and infrastructure were used. The fact that, on average, the card “Make an existing product/service green” was used relatively often at the Thai WS probably reflected the characteristics of Thai SCP.

Table E2 shows the results of counting the number of SCP opportunities that were used because each of the

ideation cards was linked with one to three idea(s) for SCP opportunities suggested by PECoP-Asia and APRSCP (2018), as shown in Table E3. “Simple count” in Table E2 means that every opportunity in every card used was counted simply as one (even if a card had more than one opportunity), and “weighted count” means that if a card used more than one opportunity, one count of the card was allocated to all the opportunities of the card evenly. For example, if a card used two opportunities, the count of one opportunity was a half, and if a card used three opportunities, the count of an opportunity was one third. The weighting factors that were used are shown in the last row of Table E3.

The tendencies of the results of the two counting methods did not differ. “Experience consumption” and “circular economy” approaches were used most often. These approaches can be considered as promising approaches for generating new ideas.



**Table E1.** Cards used for the idea generation phase at the two workshops.

Workshop	Activity domain	Card number								n
		1	2	3	4	5	6	7	8	
Thai WS	Cooling	12%	12%	12%	6%	18%	12%	0%	29%	17
	Doing housework	20%	3%	10%	7%	3%	22%	3%	32%	60
	Eating	11%	21%	5%	20%	5%	5%	11%	21%	61
	Moving in a short distance	6%	9%	9%	9%	12%	15%	24%	15%	33
	Purchasing & delivery	13%	15%	5%	8%	13%	8%	13%	26%	39
JPN WS	Tourism	37%	0%	4%	15%	11%	11%	15%	7%	27
	Working	15%	3%	6%	21%	24%	12%	9%	9%	33
	Cooling	10%	8%	12%	10%	24%	10%	14%	12%	50
	Doing housework	13%	10%	3%	3%	40%	3%	10%	17%	30
	Eating	7%	14%	11%	11%	16%	9%	11%	21%	56
Total	Moving in a short distance	8%	12%	24%	20%	24%	4%	8%	0%	25
	Working at office	13%	5%	16%	8%	11%	8%	18%	21%	38
	Avg Thai	16%	9%	7%	12%	12%	12%	11%	20%	270
	Avg JPN	10%	10%	13%	10%	23%	7%	12%	14%	199
	Avg	14%	9%	10%	11%	17%	10%	11%	18%	469

Bold values indicate the largest and second largest ones.

**Table E2.** SCP opportunities used at the idea generation phase at the two workshops.

Simple count	SCP opportunity										Total
	1	2	3	4	5	6	7	8	9	10	
Experience matters more than goods											
		Measurement of genuine wealth	Environmental policy trends	Circular economy	Sophisticated information provision	Design for local needs	Digitization technologies	Sharing economy	Infrastructure for SCP	Tacit rules	Indigenous wisdoms
Thai WS avg.	23%	11%	8%	20%	7%	4%	7%	6%	5%	5%	517
Japan WS avg.	19%	8%	5%	15%	5%	7%	5%	4%	12%	12%	368
Weighted count											
Thai WS avg.	25%	11%	8%	22%	6%	4%	6%	4%	5%	5%	270
Japan WS avg.	19%	8%	5%	18%	5%	7%	5%	3%	11%	11%	190

Bold values indicate the largest and second largest ones.

**Table E3.** Correspondence between the idea generation cards and SCP opportunities.

Card #	1	2	3	4	5	6	7	8
SCP opportunity #	3 & 4	4	6 & 11	5 & 7	9 & 10	1 & 4 & 8	1	1 & 2
Weighted	1/2	1	1/2	1/2	1/2	1/3	1	1/2



## Structuring of seventeen SCP patterns selected at the workshops



Table F1. Results of structuring of seventeen SCP patterns selected at the two workshops.

WS	CP Pattern	Goal of CP Pattern (Intermediate/Ulimate)	Important Factor (+: Promoting Factor; -: Hindering Factor; Local Factor(s) Underlined)	Important Policy Intervention	Remarks
Cooling TH	Smart infrastructure to bridge gaps between behavior and awareness	Low-carbon, green/energy-efficient products, cheap energy cost, high awareness of the environment	Cheap and non-green products (-), people consider cost more than environment (-)	Subsidies to replace old air-conditioners, social media campaign to buy green products	Transforming product stock and infrastructure by efficiency and educational approaches.
JP	"Cool" cooling – cities designed toward comfort and addressing apparent temperature	Decrease apparent temperature down to 28 °C	None	Eco-building standards, model eco-houses for humid, tropical climates	Approach of transforming infrastructure for the environment and comfort
JP	Cooling outside – Lifestyle change and space-sharing	Emphasizing low-carbon lifestyles and comfort	<u>Excessive cooling habits (-)</u>	Promotion of "cool biz" and space sharing	In shared spaces, people use air conditioners together. Utilizing natural conditions such as the underground and raindrops were also discussed.
Doing housework TH	Professional green housekeeping service for sustainable quality of working life	Expanding green job and green service market, achieving zero-emission society, improving quality of life	Developed standard of services (+), no license to become a housekeeper (+), reasonable price of service (+), mobile application that easy to use (+), housekeeping training program (+), low education level of housekeepers (-), <u>lack of privacy (-)</u> , expensive service (-)	Introduce skill development program, development of license housekeeping services, develop the platform to certify and give license of housekeeper service provider, give award to green house keeping business	Sufficiency approach by servicing for professional quality of sustainable housekeeping
JP	Cooking Outsourcing for Health And Sustainability (COHAS)	Improvement of social capital and health	Delivery service (+), high energy-efficient cooking (+)	Regulation on nutrients, support for delivery businesses	Approach to leverage eating-out culture
JP	Efficient housework by technology introduction	Decoupling of environmental loads and well-being	Introduction/replacement of energy efficient products (+)	R&D support, environmental education	Approach not expecting individual behavioral changes
Eating TH	Eating Healthy (Quantity/Quality) and Sustainability	Food waste reduction, promoting health, minimizing carbon footprint and resource use	Variety of the choice of tasty food and creative chefs (+), meat and flavor addition (-), difficulty of controlling street-food vendors and their safety issues (-)	A training program to local chefs, regulation/certification for street food and vendors, local platform for food information/health/cooking	Sufficiency approach with a priority on health
JP	Zero-waste food society	Reduction of food loss and realization of self-sufficiency and safety of food	<u>Eating-out culture (+)</u> , mom's cooking (-)	Policies to adjust food transactions through platforms and IoT	An approach that reduces waste by improving efficiency and building platforms while taking advantage of the eating-out culture. Efforts on this approach will be accelerated by incorporating safety of food and other goals of society.

(continued)



Table F1. Continued.

WS	CP Pattern	Goal of CP Pattern (Intermediate/Ultimate)	Important Factor (+/-: Promoting Factor; -/-: Hindering Factor; Local Factor(s) Underlined)	Important Policy Intervention	Remarks
JP	New eating culture with artificial foods	Balancing environmental consideration with food risk and security	Industrial creation (+/-), people's social acceptability (-)	Food safety and quality control policies	An approach that introduces new foods from the viewpoints of environmental consideration and food security. The approach will be promoted by enhancing social acceptability.
Moving in a short distance TH	Online and apps platforms (e.g., e-learning, teleworking, online shopping)	Minimizing unnecessary activities, minimizing emission, better quality of life	Culture to adopt new technology/innovation (+), familiarity of informal transport (+), no motivation for organization (-), consumers' mindset (-)	Organization transform policy, budget allocation for technology, partnership with private sectors, cyber patrol, tax motivation policy	Technology-oriented approach: digitalization and platform
JP	Society with high connectivity between walking, cycling, and public transportation	Simultaneous achievement of the reduction of air pollution/traffic congestion, carbon-free society, and health promotion	Undeveloped transportation infrastructure (-)	Development of bicycle lanes, regulations on the entry of automobiles and motorcycles, heavy taxation on automobiles and motorcycles, support for rental of fashionable bicycles	An approach that simultaneously achieves health and convenience by seamlessly connecting an eco-friendly human-powered means of transportation (for short-distance moving) with public transportation that enables long-distance moving. Hanoi was the city discussed.
JP	Hub-office and distributed telework	Simultaneous achievement of the reduction of air pollution/traffic congestion and carbon-free society	Existing system placing emphasis on face-to-face communication (-)	Support for the development and introduction of VR/AR technology and financial support for teleworkers	An approach that aims to reduce moving distances by changing infrastructure and the way of working. This approach is expected to be demanded by new generations. Hanoi was the city discussed.
Purchasing and delivery TH	Digitalized online purchasing platform	Increasing efficiency of resource/energy consumption, decarbonization, accessibility to good service for everyone, generating employment with a new mode of economy	Adaptability of the local shops to join (+), familiarity with no material consumption (+), a green consumer for repair/reuse (+), too much packaging (-), not so-trustworthy online platform (-), lack of digital literacy (-), increase in the number of delivery trips (-)	Environmental taxation and subsidy, information provision regarding waste/GHG emission, use of logistic planning platform and AI system (IoT) together with the trustworthy monitoring system	Technology-oriented approach: digitalization and platform with a care for digital divide.
Tourism (Travelling) TH	Responsible tourism	Sustainable benefits to the environment, social and well-being for host country/area	International regulation enforcement (+), insufficient budget (-), language barrier (-), local waste management system (-)	Zoning law, regulation to minimize inappropriate behaviors, promote responsible tourism respecting carrying capacity	Regulatory and informative approaches with attention to both hardware and software of tourism infrastructure.
Working					(continued)



Table F1. Continued.

WS	CP Pattern	Goal of CP Pattern (Intermediate/Ultime)	Important Factor (+: Promoting Factor; -: Hindering Factor; Local Factor(s) Underlined)		Remarks
			CP Pattern	Important Policy Intervention	
TH	Remote working, online meeting and Internet of Things	Improving productivities, improving quality of life and work balance, promoting green society, decarbonization	New generation's life (+), education in <u>equality</u> (-), lack of <u>enforcement law</u> (-)	Promote education policy (long distance), develop good evaluation system, effective communication for change behavior	Digitalization. Transforming working rules for sufficiency.
JP	Telework	Reduction of transportation and emphasis on quality of life/work (QoL)	Business outsourcing to foreign countries (+), platform in local languages (-), mental conditions such as loneliness (-), old-fashioned management (-)	Development of platforms, support centers, measures to prevent social isolation (friend service, healing robot etc.)	Approach eliminating transportation for QoL improvement. Social isolation and intellectual labor force competition, which might lead to lower QoL. Bangkok and Kuala Lumpur were the cities discussed.
JP	Co-working at shared offices	Reducing moving distances and realizing quality of work (creativity)	Demand for local work (+), benefits of office networking (+), mutual assistance (+), confidential information management (-), lack of <u>morals</u> (-)	Office-regeneration support (including tax breaks), support for installation in existing facilities, promoting cooperation among people and communities, implementation of a key project	An approach that uses creative innovation in the knowledge economy to reduce moving distances. Bangkok and Kuala Lumpur were the cities discussed.