

# Thursday, June 27

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## Concurrent Sessions 1 (11:00 AM -- 12:30 PM)

### **1b. Participation and collaboration in games and education for SCP (S-13) Room 4621**

Chair: Meike Sauerwein (Hong Kong University of Science and Technology)

#### **Well-being by numbers? Exploring the role of Somaesthetics in making self-tracking more sustainable and sociable**

*Xue Wu,*

Self-tracking presents both opportunities and challenges for sustainable production and consumption because it seeks to dataify individuals' daily activities and experiences with the aim to better understand which factors and in what ways may influence their health states or well-being. Self-tracking therefore offers the possibilities to convert data into decisions, and these decisions may feed into the positive feedback loop of sustainable production and consumption where the human well-being and the sustainable environment (both built or natural) are sought after.

Given the increasing popularity of self-tracking devices and products, such as Xiaomi Mi Band, Meiyou, Fitbit, etc, self-tracking can be an important point for both product innovations and policy interventions, with the aim to align on one side, the individual desire for self-improvement through self-knowledge, and on the other, the behavior changes that lead to healthier and caring individuals and more sustainable built or natural environment. This paper argues that, in order to enhance such process of self-knowledge, we as user researchers and product designers must design better ways of visualizing and interacting with "datafied well-being", rather than the mainstream interface forms of dashboards. From the critiques of dashboards, we draw upon both the principles of Somaesthetics and biophilia hypothesis to propose "an avatar in an environment" as central interface component. An avatar, or a humanized animal image, is proposed to provide a more intuitive understanding of one's physical, emotional and social well-being.

With the aim to illustrate how such digital image presents better and more possibilities for self-tracking activities to be more sustainable and sociable through Biophilia Effect, thereby having positive impacts for more sustainable production and consumption, this paper describes two use case scenarios – office scenario with working stress and exercise scenario to relief pressure -- in which users may be presented with more intuitive options to care for him- or herself, the others and the environments, following the principles of Somaesthetics, when using these images instead of dashboards. In short, the design challenges in using data for bodily perception, performance and presentation for sustainable production and consumption are discussed and summarized in such two use case scenarios.

#### **The Smart Consumer - Letting students uncover the hidden story behind the product label**

*Meike Sauerwein, PhD*

In Asian mega-cities like Hong Kong, structural transitions banned most local agriculture and manufacturing from the territory and consumers rely to up to 100% on imported meat, vegetables and

other consumer products. Imports from neighbouring (mostly developing) regions and countries often lack transparency and raise consumers scepticism about product labels and certifications. Most people follow a consumption driven lifestyle (many young females call “shopping” their major hobby) that seems disconnected from the impacts of product supply chains and product’s environmental and social footprints. Particularly students from majors without clear connection to sustainability topics find it difficult to grasp how their personal and professional future pathway can contribute to sustainable production and consumption.

This paper presents one of the first teaching approaches in Asia targeting directly the topic of Sustainable Consumption (SC). Covering two angles of SC

- 1) reduced consumption – (consuming less) and
- 2) consumption of ‘more sustainable consumer products’ (consuming smart).

Teaching approaches including experiential learning elements, gamification, simplified life-cycle-based impact analysis as well as projects with external collaborators aim to firstly put students from different disciplines into the shoes of consumers, exploring ‘how much consumption makes us happy’ as well as challenges and barriers to sustainable consumption. This aims to motivate sustainable consumption on a personal level. And B) it puts students into the shoes of governments, educators, and corporate stakeholders, etc. to explore tools and strategies to motivate and promote sustainable consumption in Hong Kong and show how professionals from different disciplines (marketing, retail, engineering, product developers, scientists, ...) are connected through-out product-life-cycles and can contribute to SPC.

Evaluation based on student surveys, projects and assignments are used to illustrate the effectiveness of such teaching approaches for transdisciplinary teaching of sustainability in Asian universities.

### **Gamification of people-centered product design A case study of Ant Forest**

***Zijia Wang***

This research explores "People-centered product design" via a case study of Ant Forest, a mobile app game developed by the biggest online payment tool Alipay in China. We focus on how to encourage users to cumulate environmental behaviors through everyday activities and participate in green social networks. Three major elements are carefully examined: self-tracking, social gamification and transforming online result into offline achievement.

We conducted elite interviews to key persons in Ant Forest team, and systematically analyzed the reasons why Ant Forest can make such great success in short time. This research has found that Ant Forest plays the advantage of its large user base and convenient payment function. The users can self-track their everyday environmental behaviors, and interact with each other through the designed social elements. As a result, the accumulated green points can be transferred into real trees planted by Ant Forest team in northern deserts of China. Thus its users are encouraged to self-track more environmental behavior and form a good circle.

The implication of this research shows that the cruciality of product design for charity purpose is "people-centered concept" rather than data technology. Ant Forest is a good example to indicate that when gamification joining hands with self-tracking in product design, users can be encouraged to adopt

more environmental behavior in everyday life for more green points, thus cumulate more environmental achievement.

### **HCI for development: How open collaboration can foster sustainable production and collaboration as ways of more equitable cultural development**

***Man Zhao***

Public museums in China today has been dependent on state funding, and only a small fraction of that come from the revenue of creative products, when compared to their international counterparts. Therefore, it is crucial for public museums to leverage resources, digital or otherwise that come from private companies in the open. For example, Ant Financial Services Group has open up its enterprise-level user interface (UI) component libraries for anyone in the world to provide mobile and Internet products that have optimal user experience. Such open source and open API resources can be valuable engines for change, driving a sustainable cycle of production and consumption of cultural products. Some domestic enterprises reduce the investment of resources and improve the rate of return through the mode of open innovation. So as to extend to the field of science and education, how to correctly create the museum in the digital era value innovation, to achieve the unity of social and economic benefits. According to their own characteristics, Guangdong Provincial Museum can change roles, use digital technology to digitize museum exhibits and research achievements, and then refer to the open and innovative mode of Internet platform. Release the resources in the form of modular component library, open data, open content, open API and so on, and turn the resources in the library into digital resources that can be learned through the network, so that more third parties can develop corresponding products or services. In order to face a wider range of users to create value; At the same time, it solves the pain points and usage scenes of users, in order to improve the communication efficiency and effect, increase the public education ability of the museum, and let the museum create a new generation of information technology service in the digital age. It is used to solve the regret that young students in remote areas of Guangdong province can not get to the museum in person, and further promote the research of balanced educational resources.

### **Urban sustainable living – creating eco-friendly living spaces through people's participation**

***Divya Kanchibhotla***

According to the United Nations, 68% of global population will reside in urban areas by 2050. In the past few decades the urban growth in many parts of the world has lacked sustainable practices and hence, contributed to a myriad of global problems. Sustainable urbanization on the other hand meets the needs of the present and future generations. People's participation is key for adopting a sustainable lifestyle, which happens when people consciously choose to reduce, reuse and recycle, thereby reducing their ecological footprint.

This study showcases the smart sustainable practices adopted by an urban community in Bengaluru : 'Silicon Valley of India'

Though situated in a busy metropolis, characterized by high foot traffic and a large floating population of approximately 30,000 visitors per month apart from 2000+ residents, this community has lush green covers, extremely rich biodiversity and better air quality.

A few sustainable practices include –

- o Preservation: conservation of rich species diversity of flora and fauna comprising of 146 plant species plants, 102 butterfly species, eight bees' species, 69 bird species and 28 snake species
- o Organic farming: 1,50,000 kg of organic vegetables are produced/month
- o Natural fuel: waste plastic from campus and surrounding villages is collected daily and converted to fuel. 200 kg of waste plastic yields 100 liters oil
- o Recycled paper: Waste paper/cotton is segregated and converted to handmade paper. 5 kg of shredded waste yields 100 sheets daily
- o Permaculture: Uncooked vegetable waste from kitchen is converted to compost and is used to grow 35 plant species
- o The cooked waste is used to create briquettes and LPG that are reused as fuel

Through people's participation, this community exemplifies the possibility to create an 'Oasis of sustainability' in the arid desert of urbanization.

### **1c. Sharing economy transitions, (S-07) , Room 6602**

Chair: Monique Retamal (Institute for Sustainable Futures, University of Technology Sydney),  
Samira Iran (Institute for Sustainable Business, University of Ulm)

#### **Transitions to sharing? Barriers and enablers for collaborative consumption in Southeast Asian cities *Dr Monique Retamal & Karen Hussey***

Collaborative consumption (CC) businesses offering shared-access to goods and services provide an opportunity to develop less resource intensive modes of consumption. The emergence of these businesses in rapidly growing economies in Asia therefore presents a potential contribution to sustainable consumption and production goals. Understanding the barriers and enablers for these emerging business types can provide important information for policymakers on how to support transitions to more sustainable consumption. In this study, we use the multi-level perspective framework to examine the socio-technical regimes influencing CC businesses in Hanoi and Bangkok, by drawing on document analysis and over sixty semi-structured interviews with policymakers, SCP experts, business owners and managers. In both countries, we found high-level policy support for sustainable consumption and production activities with many new laws and strategies being developed. However, so far there has been a lack of specific support for collaborative consumption style businesses that offer consumers the option to share and rent. The most significant barriers appear to be social norms regarding ownership, commercial norms, and business concerns such as a lack of access to finance. In both countries, there are a lack of legal definitions and appropriate business permits for collaborative consumption businesses, particularly with regards to transport sharing. For policymakers in Asia

interested in supporting these business types, it will be important to establish appropriate legal frameworks and to undertake awareness raising campaigns to shift consumer perceptions.

### **Framing the "Sharing Economy" in China**

***Chujia CAI, PhD student, Dr Alison Browne***

The Sharing Economy (SE), is a diffuse term for online activities that facilitate shared access to goods and services (Richardson, 2015). Although “sharing” has always been, and still is, a feature of diverse economies (Gibson-Graham, 2008; Holmes, 2018), since its connection with digital platforms SE has become an increasingly ambivalent, contested and paradoxical concept (Acquier, et al., 2017). The move to SE substantially underpins China’s shift to a service and consumption driven economy (NR Lardy, 2016; F Fu, 2014). Chinese narratives of SE are complex and paradoxical, the result of the diverse stakeholders involved in developing visions, and developing platforms and practices, of sharing (including government, academia, platform companies, venture capitals, consumers, community groups, and citizen driven social media). We present a framework for analysing the diverse features of SE in the Chinese context. We explore some tangible cases (“Mobike hunters”; DiDi online deliberation; NGO platform of targeted clothes donation; “Qing Zu Jie” neighbourhood) which vividly demonstrate how narratives of SE are shaped and strengthened or reshaped in China. These cases bring to attention a fuller spectrum of ways of conceptualising SE in the Chinese context extending from platform-based narratives to community-based narratives. In this paper, we dive into the intertwined and wrestling dynamics involved in the formation of China’s narrative of SE, analyze how it came into being, why it's problematic, and explain why we advocate a more diversified narrative of Chinese sharing economies. Doing so highlights a range of underpinning issues including wider issues of social justice and inclusion, and environmental sustainability.

### **Sharing City Seoul: Transition to a citizen-led sharing economy**

***Prof. Oksana Mont, Dr., Taein Jung***

Seoul has been designated as the first sharing city in the world in 2012. Its unique characteristic that distinguishes Seoul’s sharing city model from many other cities is its strong top-down drive from the Seoul Metropolitan Government (McLaren and Agyeman, 2015; Bernardi and Diamantini 2018). It is also seen as the “single biggest catalyst of the global sharing cities movement” (Shareable, 2018). In Seoul, local government headed by the Mayor Park Won-Soon display visible leadership over the sharing economy landscape, which expanded over the past 6 years (since 2012) and in June 2018 comprised 74 active sharing enterprises (SMG, 2018b). The strategic plan of the Seoul Metropolitan Government is in Phase III since 2019. SMG operates a dedicated Sharing City Team in the Mayor’s Office, which shows administrative commitment unparalleled to any other city. Until 2017, SMG invested around one million EUR into the programme Sharing City Initiative (SCI).

The SMG is being applauded for taking leadership role and tackling local problems by developing sharing solutions. However, according to its original plan, the aim of SMG was to deliver a private-led sharing economy through active citizen participation. The SMG would “promote and support” activities undertaken by the private sector (SMGa, n.d.), and the SMG sees itself as playing a partnership role (Johnson, 2014). Thus, the current landscape of Sharing City Seoul (SCS) shows a discrepancy between the intended structure of SCS and the reality. Despite heavy financial investment and administrative

support, there is still a lack of awareness about the sharing economy in general (KB Financial Group, 2017). Further, the most successful sharing activities are operated and/or heavily supported by the SMG such as Seoul's public bicycle system Ttareungyi, car sharing scheme Nanum Car and Human Library. It can be inferred that there is more confidence in the public schemes than those operated by private enterprises and there is no doubt that the SMG still occupies the central position in the operation of Sharing City Seoul. Recognizing limitations of the government-led design, SMG set out the aim of Phase III (2019 onwards) to make a transition towards a citizen-led sharing economy. However, this is proving difficult (SMG, 2018a).

This paper aims to map the landscape of Sharing City Seoul and to investigate the balance between city-government, private sector and citizens. Further, the paper also aims to examine factors that shaped the current structure of Seoul's top-led sharing economy and to explore the relative strengths (or weaknesses) of Seoul's sharing city model.

Based on the literature review on the evolution of Seoul's Sharing City Initiative, the study examines the level of SMG's engagement based on the municipal governance approach model (Bulkeley and Kern, 2006). Thereafter, PESTEL framework is used as the basis for conducting a macro-environmental level analysis, and factors that contributed to shape Seoul as a government-driven sharing city are identified. The research results indicate that SMG is, to an extent, tied to its administrative commitment and on-going sharing services that are provided by the government. This is partly because private actors are still underperforming, and also because there is an absence of active participation from citizens themselves. The paper concludes with policy recommendations for the future of Sharing City Seoul.

### **Exploring Institutionalisation Pathways of Urban Sharing: Towards An Explanatory Framework**

***Ms. Lucie Zvoltska, Prof. Oksana Mont, Dr., Dr. Yuliya Voytenko Palgan***

The sharing economy allows its users to share assets on online platforms. It has become prominent in cities where geographic proximity and abundance of resources allow it to grow. Cities are urged to engage with sharing platforms to harness their positive impacts, such as increased social cohesion, local economic growth, or an alternative to consumerism and throw-away thinking. However, they must also stifle any negative externalities associated with these platforms, such as inequality, environmental impacts, or precarious employment conditions. City governments play an important role in shaping the institutional environment of sharing economy organizations (SEOs). Yet, little is known about the type of institutional work SEOs and city governments engage in, and how it can help leverage the sustainability potential of the sharing economy. This paper aims to address these gaps by combining conceptual insights from neo-institutional theory with empirical data from five cities: Berlin, London, Malmö, San Francisco and Seoul. The mechanisms of institutional work of SEOs are analysed using a framework developed by Lawrence and Suddaby (2006) and adapted by Zvoltska et al. (2018). Our empirical data sources include case studies of SEOs, field observations and 80 in-depth interviews. We use empirical examples to illustrate the different modes of institutional work carried out by USOs and city governments. This paper contributes to neo-institutional theory by testing the framework for institutional work against empirical data from SEOs, third party actors, and five city governments. Furthermore, it discusses how institutional work can aid sustainability transition in cities.

## **1d. Powering a future for SCP at the sectoral level and at home (S-12), Room 2610**

Chair: Puja Sawhney (SWITCH-Asia)

### **Fuel Switching: A Case Study of EU's SWITCH-Asia Intervention in Nepal**

***Ranjan Prakash Shrestha, PhD***

Nepal's economy is largely a consumption-based economy coupled with environmental degradation. Recent years, Nepal faces environmental problems due to increasing fossil fuel consumption and resulting carbon emissions from domestic and industrial sectors. Forest management and fire hazards due to invasive biomass (weeds, shrubs, twigs, etc.) in forests and agro-forest land pose additional challenges. It is estimated that about 45 percent of the total area of the country is covered by forest and removal of this biomass are found costly. There is a growing concern over environmental problems and one of the options is mainstreaming sustainable consumption and production practices, in order to protect the environment and depletion of natural resources by transforming challenges to economic opportunities. The paper discusses replacing fossil fuel by cleaner and environmental friendly bioenergy production under Public-Private-Partnership (PPP) model by capacity building, technology innovation, developing market linkages, strengthening value chain, and engagement in policy dialogue and dissemination amongst key stakeholders, for a shift towards sustainable consumption and production patterns, thereby contributing to inclusive green growth and poverty reduction.

The paper demonstrates how unwanted forest biomass could be used to generate employment, and more income of rural communities, especially women and socially and economically disadvantaged communities, ultimately contributing to the attainment of sustainable consumption and production and climate action of SDG 2030 agenda.

The paper shares a case of the EU's SWITCH-Asia intervention in Nepal, offering an integrated approach to reduce poverty by achieving overall development, reducing economic, social, and environmental costs, and promoting sustainable consumption and production practices at the local level in the new federal governance structure with an increased role of the local government.

### **Transformation research towards Sustainable Future in climate change and energy sectors -Exploring the scenario towards 100% Renewable Energy Society**

***Muneki Adachi***

Energy sectors are one of the most important sectors to mitigate the climate change at global scale. To accomplish both 'Paris Agreement' and 'SDGs', it is the key to diffuse renewable energy. In recent years, renewable energy is rapidly diffusing and expanding in terms of electricity generation, scale and investment. Simultaneously, there have been many studies and researches with regard to the feasibility of 100%-renewable energy society. However, fossil fuels and nuclear energy are supposed to expand owing to the increasing energy demand mainly in Asia as well as renewable energy. Therefore, to realize 100% renewable energy society, it must be addressed not only to promote renewable energy but also to phase out fossil fuels and nuclear energy.

As the result of this research, 3 major scenarios towards 100% renewable energy society were induced as below.

**【Scenario A】** 'The phase-out of fossil fuels and nuclear energy by regulatory measures & the promotion of renewable energy at regional level'

This scenario means the phase out of fossil fuels & nuclear energy implemented by regulatory measure and promotion of renewable energy in regional level by municipality and citizen. And This is expected to realize 100 % renewable energy society by 2050.

**【Scenario B】** ' The policy-led promotion of renewable energy & the phase-out of fossil fuels and nuclear energy by market mechanisms '

This scenario means promotion of renewable energy led by government and the phase-out of fossil fuel and nuclear energy through market mechanisms. And this is supposed to realize from 2051 to 2075.

**【Scenario C】** 'The promotion of renewable energy by company at nation level'

This scenario means promotion of renewable energy led by company. And This is supposed to realize from 2075 to 2100.

### **Evaluation of Japanese household CO2 emission intensity of time using lifestyle-related survey microdata**

***Yida Jiang, Dr. Tomohiko Ihara***

Global CO2 emissions have been steadily rising in the past decades. As an important contributor of CO2 emissions, the residential sector has been found to have the potential to contribute to CO2 emission mitigation significantly via household lifestyle change. A common approach to evaluate the consequential CO2 emissions of household lifestyle is calculating consumption-induced CO2 emissions from resident expenditure data, using CO2 emission intensity of expenditure derived from input-output tables following the concepts of Life Cycle Assessment. However, as household lifestyle is actually a combination of the consumption of goods and the use of time, household lifestyle-induced CO2 emissions should be better evaluated through both data on household expenditures and data on household use of time. Also, the use of microdata, which is the full record of individual responses of a survey, should be able to reflect the variations of lifestyle among different households.

The study aims to evaluate the CO2 emission intensity of time of daily Japanese household activities through using the microdata of Japanese household expenditure surveys and Japanese household time use surveys. Various household activities, about which the related information is reported in time use surveys, are linked with household consumption of goods reflected in expenditure surveys, and are thus linked to CO2 emissions. The study is expected to provide information that helps identify the relative strength of CO2 emissions of household activities. Moreover, the outcome is expected to contribute to policymaking targeting climate change through encouraging the adoption of more sustainable lifestyle featuring less emission-intensive household activities.

### **Up, Up and Way Out of Control: Reducing CO2 Emissions from Flying**

***Dr. David D. Sussman, Ph.D., M.A.***



Attaining sustainable lifestyles requires solving the challenge of global transport emissions. The problem, however, is focus on the wrong altitude – the most pressing long-term concern in human movement is not driving, but flying. Air travel might be mankind’s most carbon-intensive activity, creating 6 to 47 times more emissions hourly than driving (Yale 2015). Overall impact will only worsen as airline passengers double over the next two decades (IATA 2014). The UN estimates that by 2050 the airline industry might account for 25% of all carbon emissions (Kaye 2017).

Unfortunately, key solutions for sustainable auto transportation are infeasible for airlines. There is no alternative rapid means of long-distance travel; biofuel sources are insufficient; and a sharing economy is nonexistent. This paper examines scholarship comparing two promising responses that remain: consumer lifestyle choice and government intervention. It addresses an ongoing literature debate about whether norms, prices, or their combination most effectively change individuals’ energy usage.

Individuals might be convinced, through cultural norms, to travel less. Similar to vegetarianism, they could be encouraged to reduce flying. However, social pressures for air travel continue, including “conspicuous web consumption” via Instagram. And there is evidence that voluntary abstention from flying goes against “human reason” (Higham 2018). Even self-proclaimed and well-informed environmentalists fly more than they should (Trulia 2016).

A more promising response is government intervention, via higher fuel taxes. Presently, the US taxes commercial airline fuel at 4.4 cents per gallon (NBAA 2018). Research shows consumers are driven more by price (lower flight costs) than goodwill. As costs drop, unsurprisingly, price sensitive shoppers fly more (IATA 2014). Unless tickets accurately reflect true costs of flying (fuel extraction, negative externalities), change is unlikely.

In reviewing existing evidence, this paper argues that a combination of government policy and individual action are necessary to reduce airline CO<sub>2</sub> emissions.

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## **Concurrent Sessions 2 (2:30 -- 4:00 PM)**

### **2d. Changing personal and public consumption: Experiences and movements (S-15), Room 2610**

Chair: Steven McGreevy (RIHN)

#### **Moving towards sustainability: Connection between environmental sensitivity and holistic practices** ***Divya Kanchibhotla***

Objective: A questionnaire based study to explore the relationship between holistic practices and modification in people’s behaviors towards environment and connection with nature.

Background: The environment needs our attention now more than ever before – the reason – environmental degradation and global warming. These issues have assumed alarming global proportions and require immediate action at not only at a policy level, but from each individual. Along with intervention and policy discussions, current efforts in environment conservation are also focused on behavioral aspects of humans and their responses to

environmental issues. Several strategies are being implemented to achieve grassroots solutions using 'collective effect' of individuals, which may have a profound impact on environment conservation. Mental and emotional sensitivity towards the surroundings and connection with the environment is an important part of collective effect. It can enhance an individual's participation towards actions that mitigate environmental degradation. It has been observed that on regular practice of a Yogic breathing technique – Sudarshan Kriya Yoga (SKY), an individual not only improves self-awareness, but also develops human values within that reflect in the connection and sensitivity with environment as well.

Materials and Methods: 1200 people from 32 countries participated in the study. Using scientifically accepted sociometric parameters we have documented and analyzed the relationship between the effect of the practice of SKY and connectivity with nature, environmental concern and environmental behavior.

Results: Pre and Post assessments revealed a significant shift ( $p$  value  $0.00158 \times 10^{-172}$ ,  $\alpha = 0.05$ ) in the participants' responses to questions that reflect connectivity with nature, environmental concern and environmental behavior. The responses shifted from the Neither Agree Neither Disagree category to the Strongly Agree category.

Conclusion: Through this unique study we have shown a positive correlation between holistic practices and an individual's sensitivity towards environment. Holistic practices might be key to behavior modification that enhances environmental conservation.

### **Consumers' evaluation on long working hours and organic materials: A choice experiment in Japan** ***Makiko Nakano***

Corporate social responsibility consists of many issues. Some Japanese companies recognize that it is desirable to address environmental issues. However, they have paid smaller attention to long working hours. In Japan, long working hours have caused many problems such as disease, death through overwork, and so on. There are many previous studies on examining willingness to pay (WTP) for environmental attributes. However, WTP for avoiding long working hours in Japan has not been examined in the previous studies. Therefore, the aim of this study is to examine consumers' preference on environmental issues and issues related to long working hours through choice experiments since both of these issues are important for sustainability. In the questionnaire conducted in 2018 in Japan, respondents were required to choose the towel they preferred to buy from among three hypothetical towels made of cotton. The towels had three attributes: the price, the farming method used to grow raw cotton (organic, conventional), and whether there is an employee who works more than 80 hours of overtime per month (Yes, No).

The results of conditional logit model show that both of the two issues can increase purchasing probability and that WTP for avoiding long working hours is larger than WTP for using organically grown raw cotton. The results of latent class models show that some classes have larger WTP for using organically grown raw cotton than for avoiding long working hours, while the other has larger WTP for avoiding long working hours than for using organically grown raw cotton.

Understanding the diverse preference of consumers will help companies respond diverse demands and promote sustainable production including both the environment and working conditions. In addition,

exploring the factors related to the diverse preference may contribute to consider how to increase awareness of consumers and result in promoting sustainable consumption.

### **Green public procurement for sustainable food consumption: multi-regional input-output analysis**

*Janis Brizga*

Food consumption is one of the main consumption clusters with one of the highest environmental impacts (de Ruyter et al., 2017; Kissinger, 2013; Tom et al., 2016; Virtanen et al., 2011). However, food is not only purchased by the households but in many countries also public institutions (e.g. schools, hospitals, nursing homes) are important food procurers (Cerutti et al., 2016).

Therefore, the research presented in this paper aims to evaluate possible changes in the carbon and land footprints of public food consumption, if stricter green public procurement (GPP) rules and criteria would have been introduced. To do so, I am using ecological economics approach and environmentally extended multiregional input-output analysis – EXIOBASE 3 database (Stadler et al., 2018).

The main GPP criteria evaluated in this research are the substitution of the animal-based diets with a vegetarian diet and conventional food products with organically produced food. This is the case study looking at the example of Latvia, but similar results could be applicable also to other countries.

This is a work in progress, but the initial results demonstrate that the average carbon footprint for the public catering services in schools in Latvia is 2.48 kg CO<sub>2e</sub> per student a day. It is possible to minimize this footprint by 11.6% by introducing one meat-free day a week. Additionally, environmental footprints of public food catering can be minimized by 15% increasing organic food consumption to 20% of all the public food procurement. Before the conference, additional results will be also available on the land footprint of public food consumption.

Additionally GPP criteria (e.g. the requirement for cage-free eggs, regional food provisioning and energy efficient distribution vehicles) can provide further environmental savings. To increase sustainability, it could be also useful coupling carbon and land footprint analysis with other indicators, e.g. water footprint or social impacts of food production (Goggins and Rau, 2016; Nemecek et al., 2016).

## **Friday, June 28**

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### **Concurrent Sessions 3 (11:00 AM -- 12:30 PM)**

#### **3b. Sustainability of Sharing Economy and Rebound Effects (S-05), Room 6591**

Chair: Samira Iran (University of Ulm)

**Unintended consequences of the sharing economy: The case of accommodation sharing in Amsterdam, The Netherlands**

*Ms. Lucie Zvolška, Dr. Jagdeep Singh, Dr. Andrius Plepys*

The sharing economy is a new form of resource distribution that is affecting traditional markets and consumption patterns. Enabled by the use of information and communication technology, it allows strangers to share their possessions for free or for remuneration. Online sharing platforms, such as Airbnb, Turo, or Peerby allow strangers to share accommodation, mobility or “stuff,” respectively. The sharing economy has experienced rapid growth in the past decade. In China alone, its turnover reached 4.9 trillion yuan (763.5 billion US dollars) in 2017, a 47.2 percent increase from the previous year. It has been argued by some that the sharing of resources among peers will lead to a minimisation of industrial production and the related resource depletion and environmental degradation. Consequently, the sharing economy has been heralded as a potential alternative to the unsustainable path of overconsumption. However, recent studies warn of the possible negative social, economic and environmental side effects associated with extending access to goods and services through sharing. Yet, there is almost no existing literature dealing with this issue. Our paper aims to address this gap by conducting a systematic sustainability evaluation of short-term accommodation sharing. We explore both the associated direct impacts on environmental and social sustainability and the macro and micro-level rebound effects. On the micro-level, we study broad questions, such as whether users of accommodation sharing platforms frequently go on holidays or how much resources they use as compared to traditional hotel guests. On the macro-level, we study the impact on other sectors, including transport and service sectors. We utilise data from mobile research labs conducted in Amsterdam, the Netherlands and publicly available databases. Furthermore, we employ causal loop diagrams in order to illustrate the causal structure of systems and feedback effects associated with accommodation sharing.

### **Shared vehicle services and their impact on vehicle purchasing decisions: empirical evidence from urban China**

***Yi Zheng, Dr. Walter Wehrmeyer, Prof. Steve Morse***

Ride-sourcing (RS) and car-sharing (CS) are two forms of shared mobility services in the urban transport and mobility system. Despite a vast amount of studies on sharing economy in western societies, the impact of vehicle sharing in Asian context is still underexplored. This paper intends to assess whether the two types of vehicle sharing can influence vehicle purchasing decisions for Chinese urban residents. The effect on vehicle purchasing behaviour has the potential to change the demand and supply of automobiles as well as the corresponding environmental pollutants. Questionnaire surveys were conducted targeting either ride-sourcing or car-sharing users in Beijing and Guangzhou, China. Multinomial logistic regression was applied for analysing the questionnaires. The vehicle buying decision related to such shared mobility services was assessed based on key characteristics of the services, such as cost effectiveness, time efficiency, convenience, environmentally friendliness, safety (for RS) and cleanliness (for CS). The results indicated that the impact on vehicle purchasing behaviour varies based on the frequency of using the shared services and the type of sharing services used. For instance, when considering convenience of the services as a decision-making factor for vehicle buying, RS users who use premium rides more frequently are more likely to choose to buy (or have already bought) vehicles, rather than forgo the purchase of vehicles. Referring to the level of convenience for CS, consumers who use CS service more often are also more likely to choose to buy (or have already bought) vehicles, rather than choose to forgo the purchase of cars. The results of this study can help policy makers understand

consumers' behaviour in relation to vehicle buying decisions. It also helps both private and public sectors explore whether vehicle sharing practices can aid the transition of servitisation for the automobile industry.

### **Could sharing economy in Iran be sustainable? A study of sharing economy in Iran and it's possible rebound effects**

***Dr. Samira Iran***

Sharing economy is growing all over the world. In 2017 only in Germany the market share of collaborative consumption is estimated to be € 22.9 bn. It is often claimed that such alternative consumption practices potentially have positive environmental effects. Recent lines of research indicate that sharing economy could increase the eco-efficiency by either use intensification of products or by extending their lifecycles. However, a realistic estimation of total ecological effects of sharing economy also requires the consideration of rebound effects. Eco-efficiency strategies could lead to a situation of increased resource use where as the additional used resources even might exceed the achieved savings. Santarius (2012) listed thirteen different rebound effects for green economies. Which of these rebound effects exist in the sharing economy and how could they be avoided is the topic of this research.

Big companies such as Airbnb or Uber are now expanding their services all over the world; however, they could still not offer their services in a country such as Iran with its' specific political and economic situations. As a result, collaborative consumption practices in Iran are offered by local businesses. Some of them have copied the ideas of larger international companies. For instance, local ride-sharing companies such as Snap or Tapsi are applying Uber's ideas. Others are developing more local and unique ideas, e.g. the company Mamanpaz. Using their website, housewives, who are regularly cooking for their own families, can cook more and sell their homemade food.

To explore sharing economy in Iran, about 40 in-depth interviews are conducted. Using this data set, the researched examines:

- If growing sharing economy in a developing country like Iran could be a way toward more sustainable consumption?
- Which types of rebound effects exist regarding sharing economy in Iran and how could they be avoided?

### **Environmental potential of sharing economy from life cycle perspective, Environmental potential of sharing economy from life cycle perspective**

***Eri Amasawa, Dami Moon, Jun Nakatani, Masahiko Hirao***

In this presentation, we will discuss the potential of sharing economy in reducing the environmental impact of consumption and production activities from the perspective of life cycle thinking. The way we consume products and services are rapidly diversifying with the recent development of sharing economy, and the phenomena have a potential to drive the conventional ownership-based consumption activities toward environmental and economic sustainability. However, the definition of sharing economy is often obscured, which poses challenges to understand the characteristics of the decisive factors on their environmental impact. To clarify the environmental potential of sharing economy, we conducted an analysis based on literature survey and media accounts, and performed

number of case studies on operating business models. The presentation will first provide an overview of the activities characterizing “sharing” from the conventional definition to that of current time, and pay special attention to sharing activities in Asian context that authors observed. Next, we will discuss the environmental potential of sharing economy from the perspective of life cycle thinking with case studies. Lastly, we will summarize the type of influence sharing economy could have on the environmental impact per product relative to ownership-based consumption of products.

## **Sharing Economy and Sustainable Consumption: recent experiences and theoretical debates**

### ***Dunfu Zhang***

A few leader scholars in China misuse the conceptions of “Sharing Economy” and mislead not only the audience but also the government and market stakeholders. What Zhang Xinhong said in *One book in Chinese on Sharing economy and sustainable consumption* shows not understanding but rather misunderstanding, mainly because of they are not part of the international academic community (and poor English). A few big names misunderstand, misinterpret and even twist Schor and other international scholars, thus misleading the masses (through government/social Media), causing chaos and even disaster. Ma Huateng, the founder, chairman and chief executive officer of Tencent, Asia's most valuable company, one of the largest Internet and technology companies, and the biggest investment, gaming and entertainment conglomerate in the world, declared that most obvious advantage of car sharing is to alleviate a series of problems such as environmental pollution. DiDi, China's Car Sharing Giant Claim, By choosing to share rides, DiDi users and drivers help alleviate environmental pressures on our cities. Our extensive rideshare network is also ideal for systemic introduction of new energy vehicles and eco-friendly driving technologies. According to its official online statements, In 2016, DiDi riders saved 1.44 million tons of carbon emissions through shared Hitch and Express Pool trips.

Yet, Preliminary research findings from U.S and European Scholars argued very much differently. Lyft, acknowledges that its ride-sharing service is not contributing to contraction in the overall size of automobile fleets or to reductions in vehicle miles traveled because the platform is competing primarily with taxis rather than with private automobile ownership. Uber is characteristically cagier on this point, but there is no reason to anticipate a different outcome because it is employing essentially the same business model (Cohen, 2017:62). An exception is a recent study of carsharing: It found a measurable reduction in greenhouse gas emissions, but only because of substantial reductions from a small fraction of households (Martin and Shaheen, 2010). For the majority, carsharing, by expanding access to cars, increased emissions.

Used products (second-hand stuff) sharing does. a questionnaire-based survey was conducted on more than 200 consumers in took place in Denmark, Sweden, and Estonia second-hand shops. For second-hand clothes (SHC) it was assumed that over 100 collected items 60 would be reused. All 40 non-reusable trousers are assumed to be landfilled. The Life Cycle Assessment showed that the collection, processing, and transport of second-hand clothing have insignificant impacts on the environment in comparison to the savings that are achieved by replacing virgin clothing. The reduction of impacts

resulting from the collection of 100 used garments ranges from 14% decrease of global warming for the cotton T-shirt to 45% reduction of human toxicity for the polyester/cotton trousers. The results of the study show that clothes reuse can significantly contribute to reducing the environmental burden of clothing (Farant, Olsson and Wangel, 2010) .

The ordinary assumptions about ecological impacts are generally about the first, visible shifts made by a consumer—purchasing used products rather than new ones, or staying in a private home rather than a hotel. To assess overall ecological impacts, however, we have to consider ripple effects. What does the seller or the host do with the money earned? She may use the money to buy high-impact products. Does the appearance of a market for used goods lead people to buy more new things that they intend to sell later? If travel becomes less expensive, do people do more of it? All of these effects raise ecological and carbon footprints. (Schor, 2014:7)

But Airbnb maybe not. An irreconcilable contradiction of sustainability in the comprehensive sense is that it requires tolerance of cultural differences, yet making the cost of long-distance vacations more affordable increase the demand for both travel and the resources that this form of consumption (Cohen, 2017:63) .

As to Social Sustainability, The desire to increase social connections is also a common motivation. Many sites advertise this feature of their activities, and participants often articulate a desire to meet new people or get to know their neighbors. While heartwarming anecdotes about making new friends are plentiful, many platforms fail to deliver durable social ties. For instance, a recent study of carsharing found that the two parties to the transaction often never met on account of remote access technology (Schor, 2014:6) . Communitarian provisioning as expressed by, for example, clothing swaps, community kitchens, and public libraries are interesting exceptions because the emphasis is not on transactional commerce but rather on fostering genuine forms of mutual exchange. However, this dimension of the sharing economy is , at least in the United States at present, vastly overshadowed by the commercial alternatives (Cohen, 2017:57) . Many sites in the sharing space advertise social connection as a core outcome of their activity. But do these sites actually build friendships, networks, and social trust? The evidence is mixed. Stanford sociologist Paolo Parigi and his colleagues have found that Couchsurfing does, in fact, lead to new friendships. However, the ability of the platform to create such connections, especially close ones, has declined since its inception in 2003. Users have become “disenchanted” as the relationships they form are now more casual and less durable (Schor, 2014:7).

It is Very necessary to explore and further analyze in details the social and environmental consequences of different types of sharing economy both in China and other important countries.

Sharing leads sustainable consumption? The case of bike sharing in China proved quite different. The bicycle sharing industry, characterized by being green, and convenient & efficient, and economical & environment-friendly, has boomed in 2016 with total users of up to 20.30 million and an operation market of RMB1.15 billion across the country.

Who share? Who care? Sharers (especially lower class) have been sharing. China carbon footprints of household consumption show the urban middle high, the urban rich, and the urban very rich produced the most CO2 (Wiedenhofer et al, 2017:76)

The “sharing economy” boosters claim the new technologies will yield utopian outcomes—empowerment of ordinary people, efficiency, and even lower carbon footprints. But all these arose debates. Just as Internet did not bring about the promised democracy, the sharing economy may not lead to either social or environmental sustainability.

Sharing economy giants are very likely to be platform capitalists. Echoing Communist Manifesto in producer society, The Sharers Manifesto propose that the Majority of Sharing economy (users/consumers/participants/workers/providers, most of them are poor) get united...Deng Xiaoping’s two Quotes: “Poverty is not socialism. To be rich is glorious.” “Let some people get rich first.” I would propose “Let the rich share/be environmental friendly first.” If not, please stop misleading and exploiting the people and netizens in the name of clean or green Sharing Economy.

## Saturday, June 29

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### Concurrent Sessions 4 (10:30 -- 11:50 AM)

#### **4a. Food futures in Asia: imagining and experimenting with post-growth food procurement and consumption to redefine rural-urban linkages (S-06), Room 6590**

Chair: Steven R. McGreevy (RIHN)  
(Presentations & Discussions)

**Storifying visions of future food-related social practices & mapping emergence pathways in material-competency-meaning chains: three cases from Bangkok**

*Steven R. McGreevy*

**Imagining satomachi: A radical vision for post-growth Japanese cities based on biocultural diversity and urban landscape stewardship**

*Christoph D. D. Rupprecht*

**Playing with food visions—using gaming methods to experiment with sustainable food governance and refine future pathways in Japan**

*Kazuhiko Ota*

**Beyond extractive relationships for upland Asia: exploring dependency and sufficiency in an urbanizing age**

*Max Spiegelberg*



**To eat or not to eat: Bhutan's changing landscape of meat consumption and sin**

***Mai Kobayashi***

**The wild food basket in urban Japan — Spreading practices in a post-growth, post-industrialized country**

***Norie Tamura***

**4b. Choosing sustainable lifestyles: Barriers and socio-cultural contexts (S-10), Room 4621**

Chair: Vanessa Timmer (One Earth/Utrecht University)

**Exploring the role of contextual barriers in the design of interventions for the adoption of sustainable lifestyles**

***Cecilia Grandi-Nagashiro***

Within the discourse of sustainable consumption, the need for adopting more pro-environmental behaviors that can lead to sustainable lifestyles (SLs) remains as one of the biggest challenges. To this regard, the literature indicates the existence of two kinds of barriers that hinder adoption of these: external barriers also known as contextual factors, represented by all the hindrances that exist outside the affected individuals; and internal barriers caused by phenomena that occur inside the individuals. While the former has received a considerable amount of attention, the latter has not been explored enough, especially when it comes to the design of interventions. Thus in this research, we focus on understanding how to break infrastructural barriers to the adoption of pro-environmental behaviors (PEBs) that can lead to the SLs. For this, we aimed at tackling the barriers that hinder waste prevention behaviors. We designed a social experiment in which participants were asked to carry a set of items that would help them in performing waste prevention behaviors. We conducted the experiment for 30 days, and we recruited 14 participants living in the Tokyo area. Upon finalizing the experiment, we interviewed all the participants and asked them about the experience. The qualitative analysis results showed the emergence of discourses centered on the following themes: environmental awareness, solid waste awareness, influencing other people, using the kit, refusing and spillovers. That analysis concluded that there was an overall acceptance of the usage of the kit from the participants, and in consequence of it, they showed an increased environmental and solid waste awareness, along with, the adoption of other PEBs or behaviors related to PEBs. Thus, we believe that this intervention did indeed help break some infrastructural barriers to adoption waste prevention behaviors and the creation of spillovers, meaning that interventions solely focused on external barriers could turn successful in fostering behavior changes towards SLs.

**Sustainable Consumption Cultures, Practices and Lifestyles in India**

***Ms Aakansha Choudhary, Mr. George Cheriyan, Ms Simi TB***

The concept of Sustainable Development cannot be restricted to environmental issues alone but apply to interlinked responsibilities of environment protection and human development. India is home to many traditional practices, techniques and innovative ideas which are either hidden in remote areas or have not gained exposure due to local nature or are losing ground due to modernisation. Some of these ways, means, ideas and traditional practices have the potential of influencing the modern practices and push for innovative ways for a new Sustainable World with space to accommodate all. This paper is an attempt to highlight existing examples of Sustainable Consumption Cultures, Practices and Lifestyles in India, many of them being inspired by traditional lifestyles in India, which exist either at local level or are social ventures based on a sustainable idea. The team did the initial mapping of potential existing cases, visited all the places where these concepts are being practiced to experience the viability of these ideas, and a detailed documentation was followed of the selected fifteen cases. The potential of replication of studied fifteen cases, on a larger platform at an urban level was the one of the main criteria of selecting them for inclusion in this paper. These practices can serve not only to protect the environment but also to deal with issues of poverty, inequality, gender discrimination with the aim to build a just society. The sectors for research varied from available alternatives for non-biodegradable plastics, sustainable replacements for GHG emitting cooling devices, sustainable infrastructure, and ideas promoting concept of Sharing and Circular Economy The possibility of traditional practices getting merged with the current practices and policies to achieve sustainability is also discussed. More documentation of sustainable practices (both traditional and contemporary) at global level shall help identify the potential to combine traditional practices in modern methods to achieve long term sustainability for the planet.

**Investigating the Factors in Sustainable Choices and Practices of Filipino Consumers**

***Ms. Jonna Baquillas***

The individual consumer, while at the receiving end of the production chain, plays a crucial role in providing solutions to current environmental problems. Current lifestyle that favors a throwaway culture not only contribute to the growing problem of waste products, but also allow for the propagation of unsustainable practices within different industries. Consumers need to challenge one's preference for unsustainable practices in order to shift to sustainable ways of living. This paper investigates the factors in sustainable choices and practices of Filipino consumers, using the theoretical lenses of Norm Activation Model and Theory of Planned Behavior. Filipino consumers are found to be keen on engaging in simple conservation efforts (i.e. turning off the lights when not in use, bringing of own shopping bag when buying groceries); however, for those that require more commitment (i.e. consuming organic food, decreasing consumption of meat), these are found to still be unpopular practices. The variables awareness of consequences, ascription of responsibility, perceived behavioral control, perceived marketplace influence, and personal norms are found to be significant predictors of sustainable consumption behavior. On the other hand, subjective norms yielded insignificant result, as well as the direct relationship of awareness of consequences to sustainable consumption behavior. The model was subjected to partial least squares structural equation modeling (PLS-SEM) using SmartPLS 3.0.

**Conceiving a new global leadership of Well-Being Economies for a sustainable future.**

***Luca Coscieme, Lars Fogh Mortensen, Katherine Trebeck, Paul C. Sutton, Lorenzo Fioramonti***

Recent policy reforms and economic shifts make possible to imagine sustainable futures with post-growth economies focusing on wellbeing rather than material output. At the economy level, services are promoting prosperity faster than industrial production. Innovative business models are optimizing production and consumption in a 'sharing economy', based more and more on experience and less and less on ownership. This is producing value while reducing negative impacts and costs. At the policy level, the Sustainable Development Goals (SDGs) align governments' efforts towards protecting ecosystems and promoting equality with a long-term development vision.

In order to be implemented, a 'sharing economy' and the SDGs require a shift away from neoclassical economics theory as is often confuted by real world data and phenomena, giving rise to *paradoxes*. In this paper, we provide a chronological discussion of some of these paradoxes surrounding production and consumption; wealth and wellbeing; economic growth; and the distribution of wealth within and across countries. We envision an alternative-to-G7 alliance of wellbeing economies that overcome these neoclassical economics inconsistencies with the real world. The alliance pursues a 'sharing economy' and the achievement of the SDGs following three key principles: live within planetary boundaries, equitable distribution of wealth and opportunity, and efficient allocation of resources. It aims at fundamentally re-shape global leadership away from old economic paradigms and the primacy of growing production and consumption over equitably shared environmental and social wealth.

#### **4d. Recognizing the hidden value in material flows (S-02), Room 6602**

Chair: Dr. Jason Lam (City University of Hong Kong)

#### **Trash to Treasure: Effects of Psychological Ownership Mechanisms on Perceived Valuations of Solid Waste**

***Maribel Annarose Nicole L. Alonzo, Patricia Mae T. Chi, Sanjana Abdullah Sorio, Michelle Land Yngayo Dizon, Sweet-Heart Jamotillo Francisco***

Morewedge and Glibin's (2015) endowment effect model show how psychological ownership contributes to the perceived value of objects. Applying Pierce, Kostova, and Dirk's (2003) meta-analysis of psychological ownership through Baxter, Aurisicchio, and Childs' (2015) affordance principles, it was revealed that specific user experience interactions elicit PO (psychological ownership). These PO Mechanisms were experimentally applied to solid waste targets, with functional, emotional, social, and monetary values measured using Sweeney and Soutar's PERVAL scale and Willingness to Pay-Willingness to Accept (WTP – WTA) gaps. Results from 111 resident consumers (85 females, 26 male) from 22 segregation non-complying barangays in Davao City (CENRO, 2018) indicate that the absence of PO Mechanisms or control groups had the lowest PO differentials but yielded consistently the highest results in perceived valuation means, except for the monetary dimension. Of statistical significance are PO Mechanisms' effects on social value ( $X^2(2, N = 86) = 16.985, p = 0.001 < 0.05, E2R = 0.20$ ), with the control group reporting the highest social value, followed by Investing the Self unto the Target, Controlling the Ownership Target, and Coming to Intimately Know the Target.

#### **A Review of Electronic Waste Management Practices in Africa**

### ***Mr Mathias Nigatu Bimir***

In the dynamic nature of environment and sustainability, new variables emerge every time that seek new approaches to deal with. One of the latest additions to environmental concerns is, presumably, associated with production and consumption of technological products. The exponential growth in electrical and electronic equipment production and consumption worldwide resulted in a soaring volume of electrical and electronic waste (e-waste) being generated in both developed countries and in developing countries. As a result, policy efforts that target the management of e-waste are being implemented in many countries and regions. These policies in Africa are confronted with the massive import of used electrical products with a relatively shorter life span that demands well-designed e-waste management approaches. It was frequently raised that Extended Producer Responsibility (EPR) would raise effectiveness in the management of e-waste. This paper is, therefore, aimed at analyzing the e-waste scenario and policies in Africa that target tackling the adverse impacts of e-waste to the environment and human health. It would pursue an in-depth review of literature and policy documents of selected countries in the field and discuss how far EPR is implemented to grasp key issues related to institutions and actors. The investigation would advance the existing conception of the issue from the African perspective and add value for policy learning.

### **A Systems Thinking View on Cloud Computing and Sustainability**

#### ***Zijia Wang***

Cloud computing platform companies have emerged to support the deployment of big data and artificial intelligence, thereby shaping consumptions and production as the main force of digital transformation. Whether and how the usage of cloud computing can be promoting or hindering sustainable patterns of consumption and production, has become a key issue in both business and academic sectors globally. This paper has summarized selected research findings of system thinking regarding the sustainability of economy, society, ecology, technology, etc., and introduces the latest application of such system thinking on sustainability of cloud computing, thereby identifying research gaps such as the absence of systematic research on China's cloud computing for sustainable development and its internationalization efforts. We argue that the research on the sustainability of cloud computing should be expanded and deepened according to the identified gaps. For instance, we suggest adding the factors of sustainable consumption and production into Causal-Loop diagrams of previous research, with the aim to capture the potential of open collaboration strategies currently being deployed by cloud computing platforms such as Amazon and Alibaba. This paper concludes with the usefulness of the diagrams in operationalizing sustainability design in the cloud computing development and regulations. In addition, since the current market of cloud computing is dominated by only a few giant platform companies, thus it is crucial to identify in what ways and how these platforms should be regulated for a sustainable future. Therefore, this paper proposed to have integrated sustainable strategies and organizational learning into policy making process, as well as capacity building activities to empower the regulators, group and individual cloud computing users, as ways to explore the sustainable patterns for cloud computing consumptions and productions.

### **An Exploration of the Relationship between Sharing Economy and Sustainable Consumption and Production with the Focus on Access-based Consumption of Clothing**

***Dr. Naoya Abe, Ms. Handayani Nabilah, B.Sc***

The recent rapid raise of the interest in sharing economy (SE) looks, in general, consistent with the goal of Sustainable Consumption and Production (SCP). Therefore, in our presentation, the relationship between SE and SCP will be first examined with the focus on the properties of “waste” from two dimensions, namely “ownership” and “spatio-temporal”. The presentation will then give a focus on access-based consumption of clothes as an example of sharing economy practices as “the clothing industry is the second-largest polluter in the world, second only to the oil industry,” high-end retailer Eileen Fisher has famously said (Szokan, 2016). Accordingly access-based consumption to increase clothing utilization and reduce textile waste is being proposed.

Access-based consumption of clothing has gained interest lately with emerging fashion-subscription businesses like Rent the Runway (USA) and LENA fashion library (Netherlands). However, most people are still reluctant and not used to the idea of renting clothing products. Researchers have been observing the barriers and motivations of fashion renting. Biggest barriers are believed to be hygiene and trust in providers (Armstrong et al., 2015) and perceived financial, performance and psychological risks (Lang, 2018). While opportunity to experience with style and exploring alternatives of fashion consumption serves as main benefits in fashion renting (Netter, 2015).

While clothing itself is a complex product that has emotional nature as extension of one’s identity, many aspects need to be taken account to promote fashion renting. Basic clothing segmentation have been presented by (Park, 2004) as separate tops and bottoms, semi-heavy items and formal outfits which are then associated with its usage behavior (usage frequency, usage variety and usage satisfaction). This research aims to identify the correlation of clothing categories, usage behavior and perception toward fashion renting in Japan as one of the highest countries on per capita expenditure on apparel.

#### **4e. S-14 Building sustainable, socially responsible industries (S-14), Room 2611**

Chair: Puja Sawhney (SWITCH-Asia)

#### **Industry 4.0 Policy Framework for Asian Industrialised Economies: Enabler for Sustainable Manufacturing System**

***Wong Wai Khuen***

Under the 4<sup>th</sup> Industrial Revolution, the emergence of disruptive technologies such as artificial intelligence (AI), Internet of Things (IoT) and robotics is poised to upend the conventional manufacturing system. In order to cater to the growing individualised products, producers are fast deploying smart manufacturing (or Industry 4.0) that is categorised by resource efficiency through optimisation of factory output, distribution models and supply chain. Against this backdrop a growing number of industrialised economies are evaluating and realigning their business strategies in order to remain relevant in a highly competitive global market.

This paper attempts to provide a literature-based analysis on the Industry 4.0 policy introduced by selected industrialised economies in Asia that contributed significantly to the global manufacturing trade, followed by the mapping of the Industry 4.0 policy frameworks with elements of sustainable consumption and production (SCP) related objectives. This paper surmised that the industrialised economies are well positioned to further pursue their current sustainable consumption and production (SCP) initiatives by embracing the Industry 4.0 age. The prominent factors that would accelerate the

adoption of Industry 4.0 with SCP element would be climate change mitigation strategies, growing demand for industry in managing social and environmental compliance, green technology adoption incentives and global trade prospects. Moving forward, the relevant stakeholders should contemplate a more sustainable manufacturing system by fostering closer economic integration.

### **Sustainability Assessment from a Life Cycle Perspective – A case study on an Industrial Symbiosis site** ***Karpagam Subramanian***

Industrial Symbiosis (IS) is a way of collaborating traditionally separate industries, finding ways to use the waste from one as a raw material for another. This kind of mutual exchange of materials, energy, and waste is a key towards sustainable production and consumption of products. Development of strategies to manage waste flows between companies in an IS site and analyzing whether these strategies are eco-friendly, protect the social well-being of the involved stakeholders, cost-effective and energy efficient are all areas that need to be further explored to make IS a widespread commercial reality. In this study, we propose a model from life cycle perspective for sustainability assessment of IS exchanges: Life Cycle Assessment (LCA) to measure environmental aspects and energy consumption, Social Life Cycle Assessment (SLCA) to evaluate social impacts and Life Cycle Costing (LCC) to calculate the economic burden/benefits. This method is implemented in an IS site 'The Plant' in Chicago among five alternative fuel usage scenarios for baking breads in a bakery, one of the companies in 'The Plant'. Preliminary LCA results show that fuel option of waste heat from the oven is the ideal choice in this study as it includes a net-zero energy process in biobricks production. However, this kind of an ideal scenario may not be feasible when the size of the bakery grows. Combined heat and power co-generated in an Anaerobic Digester (AD) is the second best choice, biogas follows with a slight gap, biobricks follow next, and the business as usual scenario of wood as a fuel was ranked the last. The SLCA framework for an IS site is developed with relevant stakeholders, subcategories and performance indicators. A sensitivity analysis of the Life Cycle Sustainability Assessment (LCSA) framework is presented to demonstrate the robustness of the results derived in the presence of uncertainty.

### **Assessing Heterogeneity of Consumers' Preferences for Corporate Social Responsibility Using the Best-Worst Scaling Approach**

***Takahiro Tsuge, Makiko Nakano***

The promotion of corporate social responsibility (CSR) activities, including environmental management activities is important for achieving sustainability. However, firms have just begun to address these issues and their efforts are not sufficient. One of the reasons for this is that firms do not understand the level of interest of these issues among their stakeholders. If firms understand how and to what degree stakeholders have an interest in their efforts on CSR, there is a possibility that it will encourage firms' CSR activities. Consumers are one of the important stakeholders. Therefore, consumers' evaluation of CSR activities may be useful information for firms. This study attempts to quantify Japanese consumers' preference for 13 typical corporate CSR activities in Japan by applying the best-worst scaling (BWS) approach. We conducted an online survey in February 2015 and 633 individuals responded. We employed two approaches to analyze BWS data, counting analysis and econometric analysis. The results of counting analysis and econometric analyses showed that "Product safety and immediate recall in case of defects" was identified as the most highly evaluated activity, followed by "Preventing pollution of

water, air, and soil, preventing health damage to local people and preserving the local biodiversity, even when conducting business activities abroad", while "Creating jobs in developing countries" was identified as the least highly evaluated activity. The results of random parameter logit model and latent class model showed that there is heterogeneity in evaluation among individuals. The results of our analysis provide useful information for firms as they consider the types of CSR activities to implement from the viewpoint of consumers.

### **Mapping urban responsibilities and opportunities to fisheries**

***Prof. Jerry Patchell***

Many of the world's urban centers, such as Tokyo, New York, New Orleans, and Vancouver, have been founded in locations that once supported significant inshore fisheries and a fisher population. These fisheries have been sacrificed to the expansion of the built environment and to pollution, while the viability of the fishers livelihood has withered in the face of the escalating urban economy and costs of living. In turn, these cities turned to exploitation of offshore fisheries for their supply, often to provide for marine-based food culture that was established locally. Increasingly, programs such as the marine stewardship council are attempting to reveal the responsibilities of offshore fish consumption to urban populations, yet the more profound sustainable development responsibilities and opportunities available through reviving inshore fisheries remain disregarded. While this exploitation pattern has been repeated in other major cities, this paper draws on Hong Kong to illustrate: the shift from a degraded inshore fishery to offshore exploitation; the existing mechanisms used to increase awareness of unsustainable exploitation and willingness to accept and pay for responsibility; attempts to support fishery revitalization; and the opportunities available to support a fishery and fisher population in an advanced urban economy.

### **Everyday innovation and adaptation in small-scale aquaculture value-chains**

***Louis Lebel***

Studies of innovation in the aquaculture sector have been inspired by a range of theoretical frameworks but have had little to say about the role of everyday innovation by small-scale producers and their value chains. In this study we look at the discovery, diffusion and adoption of a set of incremental and more radical innovations in five countries in the Mekong Region. Interviews were conducted with key individuals involved in 20 specific innovation cases covering fry production, fish health, culture systems, aeration and water technologies, information-communication systems, and post-harvest waste re-use. The study finds a large role for financial considerations, water and weather conditions, and disease risks in driving the discovery, diffusion and adoption of innovations. Discovery is driven by a mixture of market opportunities and production problems but is also serendipitous. Farmers and are a significant source of novel practices but also can benefit from innovations in the value-chain, for instance, those which find uses from wastes. Diffusion is a result of market selection, promotional activities, and copying. It sometimes involves translation, not just the transfer of information, for example, when introducing ecology-informed intensification. Adoption of simple adjustments in practices that are easily reversed, or modular substitutions of technologies, are more common than those requiring new ways of organizing, for instance, to support organic value chains. This study also found that information-

communication technologies are profoundly influencing the structure and functions of aquaculture innovation systems. Internet connectivity means sharing of experiences with new practices or technologies is almost instantaneous, helping condense and more tightly link discovery, diffusion and adoption – the everyday is also everywhere.