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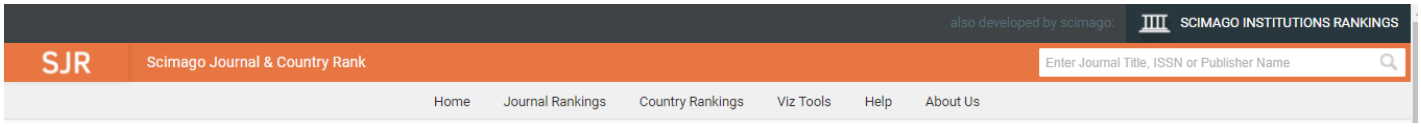

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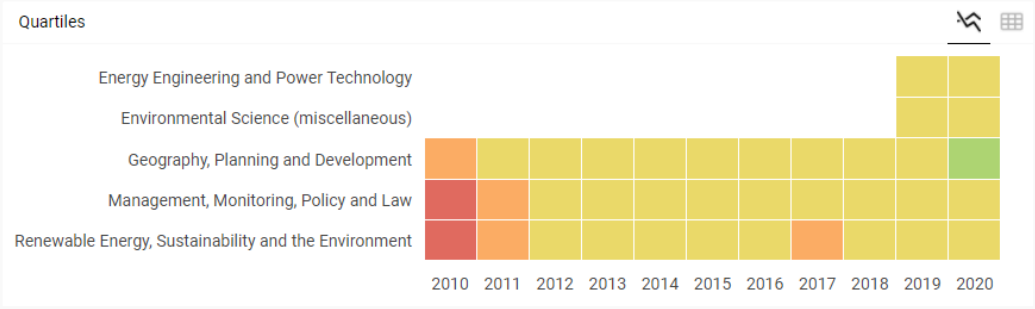

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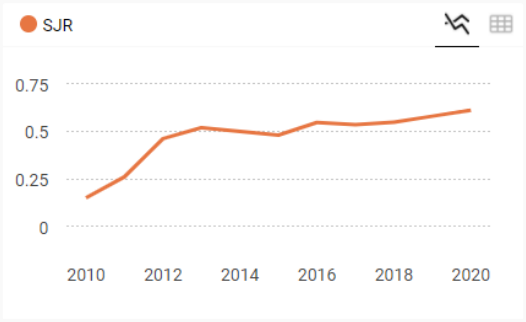

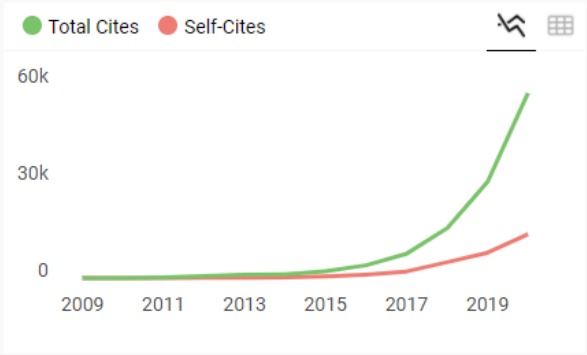

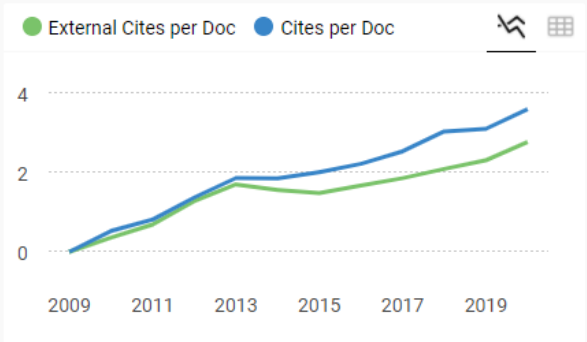

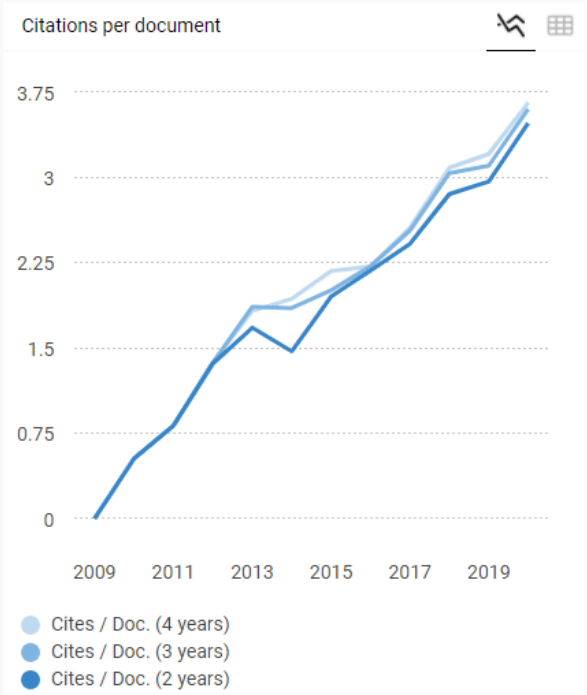

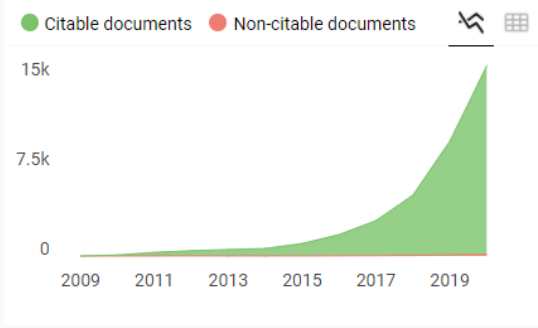

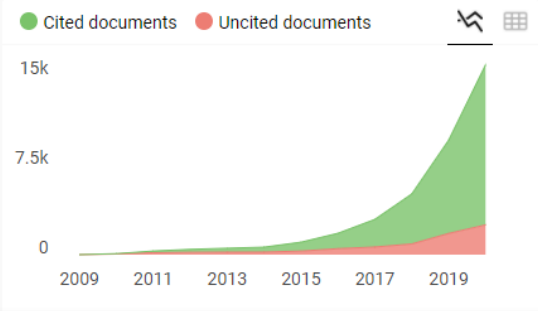

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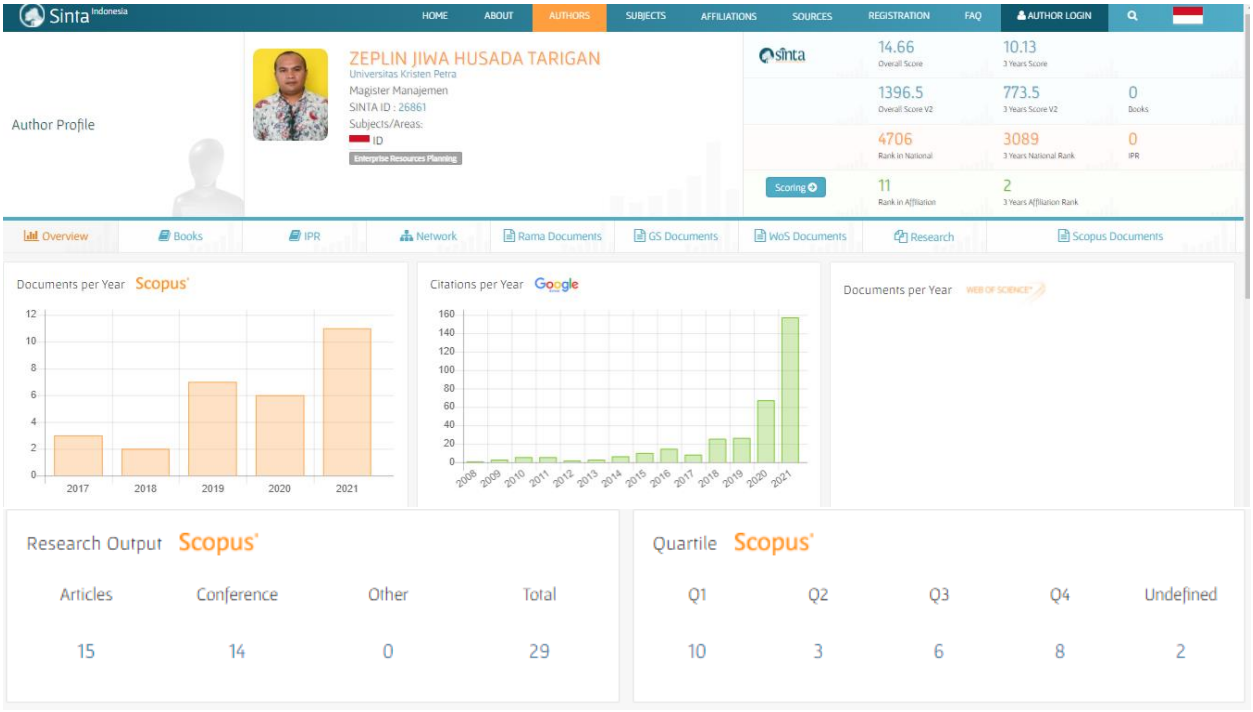
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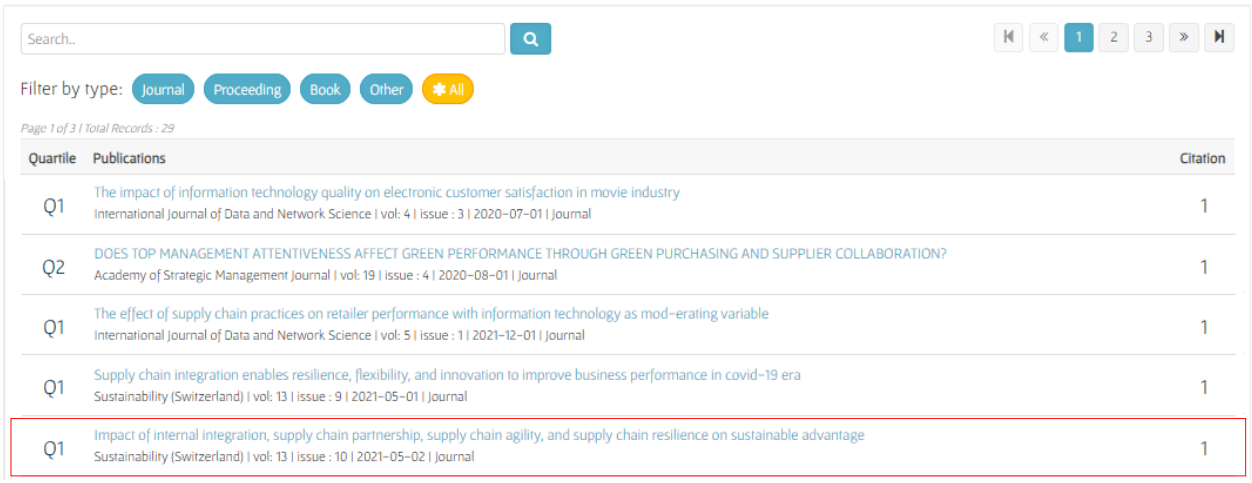
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- Special Issues
- Sections & Collections
- Article Processing Charge
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- Most Cited & Viewed
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- Journal History
- Journal Awards
- Society Collaborations
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Sustainability, Volume 13, Issue 10 (May-2 2021) – 434 articles

Cover Story (view full-size image): An ongoing decrease in habitat and species diversity in Europe, including in grasslands in mountain areas, is calling for adapted biodiversity management and measures. We show that farmers have good but varying knowledge about biodiversity management of their grasslands, as well as different perspectives on how to improve it. Farmers primarily related services of grasslands to cultural and provisioning ecosystem services. Characteristics of good grasslands were mostly related to composition, quality of forage and productivity, and structural criteria. Most measures proposed for increasing biodiversity were upgrading of forest edges, planting hedges or fruit trees, cutting grassland less or later, and reduction or omission of fertilization. Factors hindering the implementation were mainly increased workload, insufficient time, and a lack of financial means to cover additional costs. [...] Read more.

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Interests: acoustic event detection; real-time signal processing; adaptive signal processing; noise monitoring; noise annoyance; impact of noise events
Special Issues and Collections in MDPI journals
Special Issue in *Sensors*: Smart Wireless Acoustic Sensor Network Design for Noise Monitoring in Smart Cities
Special Issue in *Sensors*: Sound Monitoring Acoustic Sensor Network Design for Urban and Suburban Environments
Special Issue in *International Journal of Environmental Research and Public Health*: Crowd-Sourced Data and Distributed Sensor Networks for Environmental Acoustics Assessments in Urban and Suburban Contexts
Special Issue in *Sensors*: Acoustic Sensing Systems and Their Applications in Smart Environments

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Interests: services marketing; higher education marketing; co-creation; intellectual capital social marketing; public sector marketing
Special Issues and Collections in MDPI journals
Special Issue in *Sustainability*: Sustainability in Social Marketing and Management
Special Issue in *Sustainability*: Corporate Sustainability, Social Responsibility, and Environmental Management for Social Innovation

Prof. Dr. Javier Andrades Website
Department of Finance and Accounting, University of Cádiz, Cádiz, Spain
Interests: sustainability reporting; non-financial disclosure; public sector organizations
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Special Issue in *Sustainability*: Mandatory Sustainability Reporting in the Public Sector

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Department of Economic Analysis, Universidad Complutense de Madrid, 28223 Madrid, Spain

Interests: environmental policy from an economic perspective; industrial organization

Dr. Valeria Andreoni Website1 Website2
Future Economies Research Center, Department of Economics, Policy and International Business, Manchester Metropolitan University, Manchester M15 6BH, UK

Interests: energy economics; energy analysis; energy metabolism
Special Issues and Collections in MDPI journals
Special Issue in *Sustainability*: Sustainable Energy Efficiency and Use

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Urban Health: Assessment of Indoor Environment Spillovers on Health in a Distressed Urban Area of Rome

by Alessandra Battisti, Livia Calcagni, Alberto Calenzo, Aurora Angelozzi, Miriam Errigo, Maurizio Marceca and Silvia Iorio
Sustainability **2021**, *13*(10), 5760; **https://doi.org/10.3390/su13105760** - 20 May 2021
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Abstract It is notable that indoor environment quality plays a crucial role in guaranteeing health, especially if we consider that people spend more than 90% of their time indoors, a percentage that increases for people on low income. This role assumes even further significance [...] Read more.
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Social Facilitators of Specialist Knowledge Dispersion in the Digital Era

by Anna Pietruszka-Ortyl and Małgorzata Ćwiek
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Abstract The digital revolution has triggered disproportions resulting from unequal access to knowledge and various related skills, because the constituting new civilization is based on specific, high-context, and personalized professional knowledge. In response to these dependencies, and in line with the sustainability paradigm, the [...] Read more.
(This article belongs to the Special Issue Social Media and Sustainability in the Digital Era)

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(Un)expected Learning Outcomes of Virtual School Garden Exchanges in the Field of Education for Sustainable Development

by Johanna Lochner, Marco Rieckmann and Marcel Robischon
Sustainability **2021**, *13*(10), 5758; **https://doi.org/10.3390/su13105758** - 20 May 2021
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Abstract Global solidarity is paramount in times of global crises and essential in Education for Sustainable Development (ESD). Virtual School Garden Exchanges (VSGEs) link local gardening with global thinking. In VSGEs, elementary and secondary school students in different parts of the world exchange information [...] Read more.
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Residential Location Choice in Istanbul, Tehran, and Cairo: The Importance of Commuting to Work

by Houshmand Masoumi
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Abstract The determinants of residential location choice have not been investigated in many developing countries. This paper examines this topic, including the influence of urban travels on house location decision-making in the Middle East and North Africa (MENA). Based on 8284 face-to-face interviews in [...] Read more.
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Relationship between Emotional Labor and Burnout among Sports Coaches in South Korea: Moderating Role of Social Support

by Jae-Pil Ha, Jae-Hwan Kim and Jaehyun Ha
Sustainability **2021**, *13*(10), 5754; **https://doi.org/10.3390/su13105754** - 20 May 2021
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Abstract The purpose of this study was to examine the moderating effect of social support in the relationship between three strategies of emotional labor (surface acting, deep acting, and genuine expression) and burnout among sports coaches in South Korea. Data were collected from 259 [...] Read more.
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Business Model Innovation of IT-Enabled Customer Participating in Value Co-Creation Based on the Affordance Theory: A Case Study

by Yanli Guo, Yi Zhu and Jianbin Chen
Sustainability **2021**, *13*(10), 5753; **https://doi.org/10.3390/su13105753** - 20 May 2021
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Abstract This study uses the structured–pragmatics–situational case study approach to explore the intrinsic mechanism of enterprise digital enablement using affordance theory and how traditional enterprises enable customers to participate in value co-creation through information technology, then realize business model innovation and maintain continuous consumption. [...] Read more.
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Bridging Science and Practice-Importance of Stakeholders in the Development of Decision Support: Lessons Learned

by Innocent K. Tumwebaze, Joan B. Rose, Nynke Hofstra, Matthew E. Verbyla, Daniel A. Okaali, Panagis Katsivelis and Heather M. Murphy

Sustainability **2021**, *13*(10), 5744; **https://doi.org/10.3390/su13105744** - 20 May 2021

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Abstract User-friendly, evidence-based scientific tools to support sanitation decisions are still limited in the water, sanitation and hygiene (WASH) sector. This commentary provides lessons learned from the development of two sanitation decision support tools developed in collaboration with stakeholders in Uganda. We engaged with [...] Read more.

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Indicators for Measuring Intergenerational Fairness of Social Security Systems—The Case of the German Social Health Insurance

by Stefan Fetzer and Stefan Moog

Sustainability **2021**, *13*(10), 5743; **https://doi.org/10.3390/su13105743** - 20 May 2021

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Abstract The issue of fiscal sustainability is often labelled as a synonym for intergenerational fairness; however, pay-as-you-go schemes such as the German Social Health Insurance (SHI) involve a "natural" amount of intergenerational redistribution from younger net payers to older net beneficiaries. We calculate intertemporal [...] Read more.

(This article belongs to the Special Issue Sustainability of Fiscal Policy)

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Investigating the Suitability of a Heat Pump Water-Heater as a Method to Reduce Agricultural Emissions in Dairy Farms

by Patrick S. Byrne, James G. Carton and Brian Corcoran

Sustainability **2021**, *13*(10), 5736; **https://doi.org/10.3390/su13105736** - 20 May 2021

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Abstract The performance of an air-source heat pump water-heater (ASHPWH) system manufactured by Kronoterm was benchmarked in this study for the application of dairy farming in Ireland. The COP of the system was calculated to be 2.27 under normal operating conditions. The device was [...] Read more.

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Optimization of On-Street Parking Charges Based on Price Elasticity of the Expected Perceived Parking Cost

by Jun Li, Sifan Wu and Xiaoman Feng

Sustainability **2021**, *13*(10), 5735; **https://doi.org/10.3390/su13105735** - 20 May 2021

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Abstract Price discrimination is widely employed to regulate on-street parking behaviors to provide better service to users, and the prices are usually set according to the occupancy of parking spaces without direct consideration of user perception. A binary logit-style choice model is built to [...] Read more.

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Sustainable Energy-Related Infrastructure Development in the Mekong Subregion: Key Drivers and Policy Implications

by Han Phoumin, Sopheak Meas and Hatda Pich An
Sustainability **2021**, *13*(10), 5720; **https://doi.org/10.3390/su13105720** - 20 May 2021
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Abstract Many players have supported infrastructure development in the Mekong Subregion, bridging the missing links in Southeast Asia. While the influx of energy-related infrastructure development investments to the region has improved the livelihoods of millions of people on the one hand, it has brought [...] Read more.
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Analyzing the Characteristics of Green Bond Markets to Facilitate Green Finance in the Post-COVID-19 World

by Farhad Taghizadeh-Hesary, Naoyuki Yoshino and Han Phoumin
Sustainability **2021**, *13*(10), 5719; **https://doi.org/10.3390/su13105719** - 20 May 2021
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Abstract The COVID-19 pandemic and the global recessions have reduced the investments in green projects globally that would endanger the achievement of the climate-related goals. Therefore, the post-COVID-19 world needs to adopt the green financial system by introducing new financial instruments. In this regard, [...] Read more.
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by Zahid Yousaf, Magdalena Radulescu, Crenguta Ileana Sinisi, Luminita Serbanescu and Loredana Maria Păunescu
Sustainability **2021**, *13*(10), 5715; **https://doi.org/10.3390/su13105715** - 19 May 2021
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Abstract This study aims to explore the direct impact of the digital orientation, Internet of Things (IoT) and digital platforms on the sustainable digital innovation in the context of the digital economy and frugal environment. This study also investigated the mediating role of the [...] Read more.
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Identifying and Predicting the Credit Risk of Small and Medium-Sized Enterprises in Sustainable Supply Chain Finance: Evidence from China

by Yubin Yang, Xuejian Chu, Ruiqi Pang, Feng Liu and Peifang Yang
Sustainability **2021**, *13*(10), 5714; **https://doi.org/10.3390/su13105714** - 19 May 2021
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Abstract COVID-19 has created a strong demand for supply chain finance (SCF) for small and medium-sized enterprises (SMEs). However, the rapid development of SCF leads to more complex credit risks. How to effectively discriminate and manage SMEs to reduce credit risk has become one [...] Read more.
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The Impact of Macroeconomic, Social and Governance Factors on the Sustainability and Well-Being of the Economic Environment and the Robustness of the Banking System

by Vasile Dedu, Dan-Costin Nițescu and Maria-Alexandra Cristea
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Abstract The paper highlights the connection between the European Union banking system and a set of representative factors—macroeconomic, social, and governance factors—selected from the perspective of sustainability and well-being. The analysis is carried out as a panel regression on EU member countries with annual [...] Read more.
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Employee Service Quality at Uzbekistani Halal Restaurants Amid the COVID-19 Pandemic

by Zoirova Shokhsanam and Young-joo Ahn
Sustainability **2021**, *13*(10), 5712; **https://doi.org/10.3390/su13105712** - 19 May 2021
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Abstract In this study, we examined the employee service dimensions which are associated with satisfaction and customers' intention to revisit among Uzbekistani customers who visit halal restaurants in Korea. We also investigated the situational factor of the pandemic outbreak and the moderating role of [...] Read more.
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by Harpinder Sandhu, Adele Jones and Patrick Holden
Sustainability **2021**, *13*(10), 5710; **https://doi.org/10.3390/su13105710** - 19 May 2021
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Abstract The application of true cost accounting (TCA) at farm level requires a common framework and metric for measuring, capturing and valuing sustainability. We propose such a framework and farm metric that build on the four capitals—natural, social, human and produced—that are essential for [...] Read more.
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How to Improve Food Quality in the Domestic Market: The Role of "Same Line Same Standard Same Quality"—Evidence from a Consumer Choice Experiment in China

by Lin Bai, Zhanguo Zhu and Tong Zhang
Sustainability **2021**, *13*(10), 5709; **https://doi.org/10.3390/su13105709** - 19 May 2021
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Abstract Consumers are increasingly concerned about food quality. The "Same line Same standard Same quality" (Santong) program has been implemented to improve food quality in the Chinese domestic market. The Santong program means that exporters are encouraged to produce goods on the same production [...] Read more.

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by Ke Ding, Helian Xu and Rongming Yang
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Abstract This article used China as an example to study how tax reform affects the innovative behavior of companies. Our research showed that value-added tax (VAT) reform can affect corporate innovation behavior. On the basis of patent-application data of Chinese enterprises, we used the [...] Read more.
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Café and Restaurant under My Home: Predicting Urban Commercialization through Machine Learning

by Seung-Chul Noh and Jung-Ho Park
Sustainability **2021**, *13*(10), 5699; **https://doi.org/10.3390/su13105699** - 19 May 2021
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Abstract The small commercial stores opening in housing structures in Seoul have been soaring since the beginning of this century. While commercialization generally increases urban vitality and achieves land use mix, cafés and restaurants in low-rise residential areas may attract numerous passenger populations, with [...] Read more.
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Sustainability Interventions on Agro-Ecosystems: An Experience from Yunnan Province, China

by Jun Fan, Xingming Fan, Attachai Jintrawet and Horst Weyerhaeuser
Sustainability **2021**, *13*(10), 5698; **https://doi.org/10.3390/su13105698** - 19 May 2021
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Abstract Increasing agricultural production, without having a pronounced negative impact on ecosystems, continues to be a massive challenge. Interventions in sustainability that improve agro-ecosystems are thus crucial. Current literature focuses on sustainability concepts, assessment tools, and intervention impacts, yet lacks in intervention mechanisms and [...] Read more.

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Performance-Based Planning to Reduce Flooding Vulnerability Insights from the Case of Turin (North-West Italy)

by Stefano Salata, Silvia Ronchi, Carolina Giaimo, Andrea Arcidiacono and Giulio Gabriele Pantaloni
Sustainability **2021**, *13*(10), 5697; **https://doi.org/10.3390/su13105697** - 19 May 2021
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Abstract Climate change impacts urban areas with greater frequency and exposes continental cities located on floodplains to extreme cloudbursts events. This scenario requires developing specific flooding vulnerability mitigation strategies that improve local knowledge of flood-prone areas at the urban scale and supersede the traditional [...] Read more.
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Data Exchange Processes for the Definition of Climate-Proof Design Strategies for the Adaptation to Heatwaves in the Urban Open Spaces of Dense Italian Cities

by Eduardo Bassolino, Valeria D'Ambrosio and Alessandro Sgobbo
Sustainability **2021**, *13*(10), 5694; **https://doi.org/10.3390/su13105694** - 19 May 2021
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Abstract The growing awareness of the danger of extreme weather phenomena highlights the inadequacy of current cities and the increase in their level of vulnerability concerning the impacts resulting from climate change. The theme of design to combat climate impacts requires the development of [...] Read more.
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Empirical Study on the Relationship between Effective Following Behavior and Derived Creative Work Behavior: A Moderating Role of Perceived Organizational Support and Sustainable Leadership

by Xiaoyan Wang, Liren An, Nosheena Yasir, Nasir Mahmood and Ying Gu
Sustainability **2021**, *13*(10), 5693; **https://doi.org/10.3390/su13105693** - 19 May 2021
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Abstract The leader of an organization and its members together constitute a binary structure of the main body of the organization and achievement of their goals. The existing literature mainly focuses on the characteristics and following behavior of members. Although the Leader-Member Exchange (LMX) [...] Read more.
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Development of Platform Independent Mobile Learning Tool in Saudi Universities

by Daniyal M. Alghazzawi, Syed Hamid Hasan, Ghadah Aldabbagh, Mohammed Alhaddad, Areej Malibari, Muhammad Zubair Asghar and Hanan Aljuaid
Sustainability **2021**, *13*(10), 5691; **https://doi.org/10.3390/su13105691** - 19 May 2021
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Abstract The term "mobile learning" (or "m-learning") refers to using handheld phones to learn and wireless computing as a learning tool and connectivity technology. This paper presents and explores the latest mobile platform for teaching and studying programming basics. The M-Learning tool was created [...] Read more.
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Analysis and Prediction of Pedestrians' Violation Behavior at the Intersection Based on a Markov Chain

by Chengyuan Mao, Lewen Bao, Shengde Yang, Wenjiao Xu and Qin Wang
Sustainability **2021**, *13*(10), 5690; **https://doi.org/10.3390/su13105690** - 19 May 2021
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Abstract Pedestrian violations pose a danger to themselves and other road users. Most previous studies predict pedestrian violation behaviors based only on pedestrians' demographic characteristics. In practice, in addition to demographic characteristics, other factors may also impact pedestrian violation behaviors. Therefore, this study aims [...] Read more.

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Implementing Rapid Climate Action: Learning from the 'Practical Wisdom' of Local Decision-Makers

by Andy Yuille, David Tyfield and Rebecca Willis
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Abstract A global goal to limit dangerous climate change has been agreed through the 2015 Paris Accords. The scientific case for action has been accepted by nearly all governments, at national and local or state level. Yet in all legislatures, there is a gap [...] Read more.
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Long-Term Application of Organic Wastes Improves Soil Carbon and Structural Properties in Dryland Affected by Coal Mining Activity

by Ahmed Ali Abdelrhman, Lili Gao, Shengping Li, Jinjing Lu, Xiaojun Song, Mengni Zhang, Fengjun Zheng, Huijun Wu and Xueping Wu
Sustainability **2021**, *13*(10), 5686; **https://doi.org/10.3390/su13105686** - 19 May 2021
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Abstract Organic wastes have a positive impact on soil physical and chemical properties in the agroecosystems. However, its main effects on soil organic carbon (SOC) or total organic carbon, TOC (SOC and coal-C) contents as well as their effects on soil physico-chemical properties are [...] Read more.
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Research on Supplier Collaboration of Daily Consumer Goods under Uncertainty of Supply and Demand

by Tianwen Song, Qiang Zhang, Junmu Ran and Wenxue Ran
Sustainability **2021**, *13*(10), 5683; **https://doi.org/10.3390/su13105683** - 19 May 2021
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Abstract This paper establishes the decentralized decision-making model of consumer goods, the active collaboration model of consumer goods suppliers, and the decentralized decision-making model of customized consumer goods. Through formula derivation and simulation, the benefit and influence differences of the three modes are compared. [...] Read more.
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Study on the Influencing Factors and Acting Path of the Sustainable Development of Rural Tourism Based on EEAM-ISM Model

by Gangmin Weng, Yue Pan and Jianpu Li
Sustainability **2021**, *13*(10), 5682; **https://doi.org/10.3390/su13105682** - 19 May 2021
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Abstract The sustainable development of rural tourism is a complex system that includes both objective environmental factors and subjective human factors. Based on the three dimensions of "man–machine–environment", the element event analysis method (EEAM) is introduced to identify and determine the components of the [...] Read more.

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by Llewellyn Leonard and Rolf Lidskog

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Abstract Within sustainability development paradigms, state governance is considered important in interventions to address risks produced by the industrial society. However, there is largely a lack of understanding, especially in the Global South, about the nature and workings of the governance institutions necessary to [...] Read more.

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Understanding Farmers' Trait Preferences for Dual-Purpose Crops to Improve Mixed Crop–Livestock Systems in Zimbabwe

by Mequanint B. Melesse, Amos Nyangira Tirra, Chris O. Ojiewo and Michael Hauser

Sustainability **2021**, *13*(10), 5678; **https://doi.org/10.3390/su13105678** - 19 May 2021

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Abstract Competition over land between food and fodder production, along with recurrent droughts and increasing population, has put mixed crop–livestock farming systems in the drylands of sub-Saharan Africa under pressure. Dual-purpose crops hold huge potential to ease this pressure and simultaneously improve food and [...] Read more.

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Social Networking Service as a Marketing Technology Tool and Sustainable Business in the Lodging Industry: Investigating the Difference across Older and Younger Age Groups among Tourists

by Heesup Han, Linda-Heejung Lho, Heekyoung Jung, Antonio Ariza-Montes and Luis Araya-Castillo

Sustainability **2021**, *13*(10), 5673; **https://doi.org/10.3390/su13105673** - 18 May 2021

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Abstract Despite the importance of social networking services (SNSs), their engagement and their role as a critical marketing technology tool in explaining travellers' approach behaviours are not well known. The present study investigated the influence of SNS engagement on traveller loyalty generation for a [...] Read more.

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AI Technology and Online Purchase Intention: Structural Equation Model Based on Perceived Value

by Jiwang Yin and Xiaodong Qiu

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Abstract (1) Background: AI technology has been deeply applied to online shopping platforms to provide more accurate and personalized services for consumers. It is of great significance to study the different functional experiences of AI for consumers to improve the current application status of [...] Read more.

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by Farhan Ahmed, Aamir Aijaz Syed, Muhammad Abdul Kamal, Maria de las Nieves López-García, Jose Pedro Ramos-Requena and Swati Gupta

Sustainability **2021**, *13*(10), 5669; **https://doi.org/10.3390/su13105669** - 18 May 2021

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Abstract COVID-19 is certainly the first sustainability crisis of the 21st century. The paper examines the impact of COVID-19 on the Indian stock and commodity markets during the different phases of lockdown. In addition, the effect of COVID-19 on the Indian stock and commodity [...] Read more.

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Circular Economy Matchmaking Framework for Future Marketplace Deployment

by Lucyna Łękawska-Andrinopoulou, Georgios Tsimiklis, Sarah Leick, Manuel Moreno Nicolás and Angelos Amditis

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Abstract Online marketplaces enable cooperation between potential stakeholders by supporting offer and demand identification at the secondary raw material markets. The use of marketplaces facilitates communication between supply chain actors operating within the same or different industry sectors and enables detection of ways to [...] Read more.

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Examining the Impact and Influencing Channels of Carbon Emission Trading Pilot Markets in China

by Qiong Wu, Kanittha Tambunlertchai and Pongsa Pornchaiwiseskul

Sustainability **2021**, *13*(10), 5664; **https://doi.org/10.3390/su13105664** - 18 May 2021

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Abstract As China has an important role in global climate change, the Chinese government has set goals to improve its environmental efficiency and performance and launched carbon emission trading pilot markets in 2013, aiming to reduce CO_2 emissions. Based on panel data of [...] Read more.

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Optimal Allocation of Gas Resources to Different Consumption Sectors Using Multi-Objective Goal Programming

by Ieva Meidute-Kavaliauskiene, Vida Davidaviciene, Shahryar Ghorbani and Iman Ghasemian Sahebi

Sustainability **2021**, *13*(10), 5663; **https://doi.org/10.3390/su13105663** - 18 May 2021

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Abstract Natural gas is a main source of energy in Iran, and optimal allocation to different sectors is crucial, based on realities, geopolitical considerations, and national security concerns. In this paper, a multi-objective goal programming model is developed to study the optimal allocation of [...] Read more.

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by Matthias Klumpp and Dominic Loske
Sustainability **2021**, *13*(10), 5650; **https://doi.org/10.3390/su13105650** - 18 May 2021
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Abstract The increasing use of information technology (IT) in supply chain management and logistics is connected to corporate advantages and enhanced competitiveness provided by enterprise resource planning systems and warehouse management systems. One downside of advancing digitalization is an increasing dependence on IT systems [...] Read more.
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by Giovani Preza-Fontes, Junming Wang, Muhammad Umar, Meilan Qi, Kamaljit Banger, Cameron Pittelkow and Emerson Nafziger
Sustainability **2021**, *13*(10), 5649; **https://doi.org/10.3390/su13105649** - 18 May 2021
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Abstract Freshwater nitrogen (N) pollution is a significant sustainability concern in agriculture. In the U.S. Midwest, large precipitation events during winter and spring are a major driver of N losses. Uncertainty about the fate of applied N early in the growing season can prompt [...] Read more.
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A Conceptual Model Based on the Activity System and Transportation System for Sustainable Urban Freight Transport

by Demostenis Ramos Cassiano, Bruno Vieira Bertoncini and Leise Kelli de Oliveira
Sustainability **2021**, *13*(10), 5642; **https://doi.org/10.3390/su13105642** - 18 May 2021
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Abstract Urban freight transport (UFT) is simultaneously responsible for maintaining the urban lifestyle and the negative externalities impacting urban areas, necessitating strategies that promote sustainable urban freight transport (SUFT). In addition, the stakeholders and geographic factors involved in UFT impose specific concerns in the [...] Read more.
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How the Balanced Scorecard Is Implemented in the Spanish Footwear Industry

by Carlos Suárez-Gargallo and Patrocinio Zaragoza-Sáez
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Abstract This paper provides a deeper knowledge of the implementation of the Balanced Scorecard (BSC) in the Spanish footwear industry, under an exploratory research which has been conducted with a final sample of seven firms. An online questionnaire was developed, supported by phone calls [...] Read more.
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English-Medium Instruction as a Pedagogical Strategy for the Sustainable Development of EFL Learners in the Chinese Context: A Meta-Analysis of Its Effectiveness

by Jian-E Peng and Xiaowen (Serina) Xie

Sustainability **2021**, *13*(10), 5637; **https://doi.org/10.3390/su13105637** - 18 May 2021

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Abstract With English-medium instruction (EMI) as a pedagogical strategy being practiced worldwide in higher education (HE), extensive research has explored stakeholders' attitudes toward, and perceived benefits and challenges of EMI based on self-report data. However, the actual effectiveness of EMI on students' subject content [...] Read more.

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Comparing Passenger Satisfaction, Employees' Perspective and Performance on Quality and Safety Indicators: A Field Study

by Luca D'Alonzo, Maria Chiara Leva and Edgardo Bucciarelli

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Improving the Performance of Single-Intersection Urban Traffic Networks Based on a Model Predictive Controller

by Sadiqa Jafari, Zeinab Shahbazi and Yung-Cheol Byun

Sustainability **2021**, *13*(10), 5630; **https://doi.org/10.3390/su13105630** - 18 May 2021

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by Francisco M. Moreno-Pino, Rocío Jiménez-Fontana, José María Cardeñoso Domingo and Pilar Azcárate Goded

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Impact of Green Training on Environmental Performance through Mediating Role of Competencies and Motivation

by Eiad Yafi, Shehnaz Tehseen and Syed Arslan Haider
Sustainability **2021**, *13*(10), 5624; **https://doi.org/10.3390/su13105624** - 18 May 2021
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Abstract In cities with an extensive air quality monitoring (AQM) system, the results of pollutant concentration measurements obtained in this system can be used not only for current assessments of air pollution, but also for analyzes aimed at better identification of factors influencing the [...] Read more.
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by Keifa Vamba Konneh, Hasan Masrur, Mohammad Lutfi Othman, Hiroshi Takahashi, Narayanan Krishna and Tomonobu Senjyu

Sustainability **2021**, *13*(10), 5615; **https://doi.org/10.3390/su13105615** - 18 May 2021

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by Mu-Jung Huang, Kuo-Chih Cheng, Shao-Hsi Chung, Huo-Ming Wang and Kuo-Hua Wang

Sustainability **2021**, *13*(10), 5614; **https://doi.org/10.3390/su13105614** - 18 May 2021

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Abstract As the relationship between the execution of budget participation and innovation performance is still full of controversy, and the innovation capability formed by the important control elements of the organization is the key to bring about product innovation performance, this study aims to [...] Read more.

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by Ryuichi Shibasaki, Daisuke Watanabe and Tomoya Kawasaki

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A Conceptual Framework Integrating "Building Back Better" and Post-Earthquake Needs for Recovery and Reconstruction

by Manjiang Shi, Qi Cao, Baisong Ran and Lanyan Wei
Sustainability **2021**, *13*(10), 5608; **https://doi.org/10.3390/su13105608** - 18 May 2021
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Abstract Global disasters due to earthquakes have become more frequent and intense. Consequently, post-disaster recovery and reconstruction has become the new normal in the social process. Through post-disaster reconstruction, risks can be effectively reduced, resilience can be improved, and long-term stability can be achieved. [...] Read more.
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Abstract While prior studies recognize the importance of organizational capabilities for family firm sustainability, current research has still failed to empirically identify the role of different types of knowledge accumulation with regard to these organizational capabilities. Based on the dynamic capabilities theory, the main [...] Read more.
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by Massimiliano Masullo, Asli Ozcevik Bilen, Roxana Adina Toma, Gulsen Akin Guler and Luigi Maffei
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Abstract Growing tourist flows, which crowd ancient city centres, have modified their liveability and threatened conservation. They have increased the need for quiet places, primarily where green parks are missing. While previous studies have highlighted the possibility of reusing hidden sites of historical buildings, [...] Read more.
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by Melih Yildiz, Burcu Bilgiç, Utku Kale and Dániel Rohács
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Abstract Autonomous Vehicles (AVs) represent an emerging and disruptive technology that provides a great opportunity for future transport not only to have a positive social and environmental impact but also traffic safety. AV use in daily life has been extensively studied in the literature [...] Read more.
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by Eko Supriyanto, Jayan Sentanuhady, Ariyana Dwiputra, Ari Permana and Muhammad Akhsin Muflikhun

Sustainability **2021**, *13*(10), 5599; **https://doi.org/10.3390/su13105599** - 17 May 2021

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Abstract Biodiesel has caught the attention of many researchers because it has great potential to be a sustainable fossil fuel substitute. Biodiesel has a non-toxic and renewable nature and has been proven to emit less environmentally harmful emissions such as hydrocarbons (HC), and carbon [...] Read more.

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by Stasys Mizaras and Diana Lukmine

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Abstract Effective formation and implementation of forest policy can only be achieved with orientation to the most important goal—increasing society's welfare. The global problem is, at present, that the impact of forests on society welfare indexes have not been identified. The aim of the [...] Read more.

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by Jehanzeb Khan Gurmani, Noor Ullah Khan, Muhammad Khalique, Muhammad Yasir, Asfia Obaid and Nur Ain Ayunni Sabri

Sustainability **2021**, *13*(10), 5594; **https://doi.org/10.3390/su13105594** - 17 May 2021

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Abstract Voluntary pro-environmental behaviors in the workplace such as organizational citizenship behavior towards environment (OCBE) are pertinent for the organizations striving to become environmentally responsible entities. The significance of OCBE for green organizational initiatives has led scholars to strive for expanding its nomological network. [...] Read more.

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by Junfeng Yang, Ahmed Tlili, Ronghuai Huang, Rongxia Zhuang and Kaushal Kumar Bhagat

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Abstract Digital learning competence (DLC) can help students learn effectively in digital learning environments. However, most of the studies in the literature focused on digital competencies in general without paying specific attention to learning. Therefore, this paper developed a DLC framework based on a [...] Read more.

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by Snežana Tadić, Milovan Kovač, Mladen Krstić, Violeta Roso and Nikolina Brnjac
Sustainability **2021**, *13*(10), 5590; **https://doi.org/10.3390/su13105590** - 17 May 2021
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Abstract The development of intermodal transportation (IT) systems is of vital importance for the sustainability of logistics activities. The existing research point at individual directions of action for system improvement and increase of IT participation in overall transportation, thus reducing negative impacts of logistics [...] Read more.
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by Lucia Briamonte, Raffaella Pergamo, Brunella Arru, Roberto Furesi, Pietro Pulina and Fabio A. Madau
Sustainability **2021**, *13*(10), 5589; **https://doi.org/10.3390/su13105589** - 17 May 2021
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Abstract Today, the transition to a more sustainable model of the agro-food system is increasingly impellent, requiring all actors' commitment. In particular, small and medium agro-food business (SMABs) play a decisive and central role in the food and economies of national and underdeveloped areas. [...] Read more.
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by Wenbo Wang and Hail Park
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Abstract In this study, we carry out a comparative analysis between the US and South Korea, with a special attention to three key areas, including the stock market, the currency market, and the bond market. By employing a composite model, VAR-GARCH-BEKK, we will attempt [...] Read more.

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Investigating the Effectiveness of Using a Technological Approach on Students' Achievement in Mathematics–Case Study of a High School in a Caribbean Country

by Kendale Kashiem Dario Liburd and Hen-Yi Jen
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Abstract It has always been a challenge for teachers to engage and motivate students to learn mathematics, due to the abstractness of some topics and the need for visual representation and technological resources. This study explores the effectiveness of using a technological approach on [...] Read more.
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Sustainability and Resilience Revisited: Impact of Information Technology Disruptions on Empirical Retail Logistics Efficiency

by Matthias Klumpp and Dominic Loske
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Abstract The increasing use of information technology (IT) in supply chain management and logistics is connected to corporate advantages and enhanced competitiveness provided by enterprise resource planning systems and warehouse management systems. One downside of advancing digitalization is an increasing dependence on IT systems [...] Read more.
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by Giovani Preza-Fontes, Junming Wang, Muhammad Umar, Meilan Qi, Kamaljit Banger, Cameron Pittelkow and Emerson Nafziger
Sustainability **2021**, *13*(10), 5649; **https://doi.org/10.3390/su13105649** - 18 May 2021
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Abstract Freshwater nitrogen (N) pollution is a significant sustainability concern in agriculture. In the U.S. Midwest, large precipitation events during winter and spring are a major driver of N losses. Uncertainty about the fate of applied N early in the growing season can prompt [...] Read more.
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by Sven Kesselring, Weert Canzler and Vincent Kaufmann
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Abstract Sustainable automobilities is one of the key topics of the mobile risk society and the future of modern societies in general [...] Full article
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by Burhan, Udisubakti Ciptomulyono, Moses Laksono Singgih and Imam Baihaqi
Sustainability **2021**, *13*(10), 5647; **https://doi.org/10.3390/su13105647** - 18 May 2021
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Abstract Increased manufacturing activity has an impact on environmental quality degradation. Waste generated from manufacturing activities is one of the causes. Previous studies have referred to this waste as value uncaptured. Minimizing value uncaptured is a solution to improve environmental quality. This study aims [...] Read more.
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by Demostenis Ramos Cassiano, Bruno Vieira Bertoncini and Leise Kelli de Oliveira
Sustainability **2021**, *13*(10), 5642; **https://doi.org/10.3390/su13105642** - 18 May 2021
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Abstract Urban freight transport (UFT) is simultaneously responsible for maintaining the urban lifestyle and the negative externalities impacting urban areas, necessitating strategies that promote sustainable urban freight transport (SUFT). In addition, the stakeholders and geographic factors involved in UFT impose specific concerns in the [...] Read more.
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by Carlos Suárez-Gargallo and Patrocinio Zaragoza-Sáez
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by Gisela Demo, Karla Coura, Fernanda Scussel and Graziela Azevedo
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Abstract Although the chocolate market has become increasingly larger and more competitive, no diagnostic measures were found to evaluate relationship marketing from customer perspectives in this very attractive market in the B2C context. Thus, the main purpose of this paper is to obtain validity [...] Read more.
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by Zeplin Jiwa Husada Tarigan, Hotlan Siagian and Ferry Jie
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Abstract The global order has suddenly changed due to the COVID-19 pandemic. Many countries, including Indonesia, have applied lockdown policies to stop the spread of COVID-19. Lockdown policies have disrupted the supply of raw materials and the demand for finished goods. The manufacturing industry [...] Read more.
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The Initial Training of Science Teachers in African Countries: A Systematic Literature Review

by Diana Soares, Betina Lopes, Isabel Abrantes and Mike Watts
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Abstract This study presents a systematic literature review (SLR) on the initial training of science teachers in Africa based on selected research articles, in the period 2000–2020, that emphasize the importance of surveying knowledge that goes beyond those that historically have a longer path [...] Read more.
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Determinants of Household Income and Willingness to Pay for Indigenous Plants in North West Province, South Africa: A Two-Stage Heckman Approach

by Abiodun Olusola Omotayo, Peter Tshepiso Ndhlovu, Seleke Christopher Tshwene, Kehinde Oluseyi Olagunju and Adeyemi Oladapo Aremu

Sustainability **2021**, *13*(10), 5458; **https://doi.org/10.3390/su13105458** - 13 May 2021

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Abstract Using a cross-sectional dataset, this study examines the factors influencing the income and willingness to pay for indigenous plants by rural households in the North West Province of South Africa. The method of data analysis was based on a two-stage Heckman model. Based [...] Read more.

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Pandemic or Environmental Socio-Economic Stressors Which Have Greater Impact on Food Security in the Barishal Division of Bangladesh: Initial Perspectives from Agricultural Officers and Farmers

by Sayeda Sabrina Ali, Md. Raju Ahmad, Jalal Uddin Mohammad Shoaib, Mohammad Aliuzzaman Sheik, Mohammad Imam Hoshain, Rebecca L. Hall, Katrina A. Macintosh and Paul N. Williams

Sustainability **2021**, *13*(10), 5457; **https://doi.org/10.3390/su13105457** - 13 May 2021

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Abstract The COVID-19 pandemic and subsequent protectionary lockdowns have had a dramatic impact on agricultural production globally. Barishal division is the 'grain-basket' of Bangladesh and a main rice cultivation centre within the country. This study captures perspectives on the environmental socioeconomic stressors impacting primary [...] Read more.

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by Jawad Haqbeen, Sofia Sahab, Takayuki Ito and Paola Rizzi

Sustainability **2021**, *13*(10), 5453; **https://doi.org/10.3390/su13105453** - 13 May 2021

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Abstract Planning a city is a systematic process that includes time, space, and groups of people who must communicate. However, due to security problems in such war-ravaged countries as Afghanistan, the traditional forms of public participation in the planning process are untenable. In particular, [...] Read more.

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COVID-19 in the Field of Education: State of the Art

by Alfredo Corell-Almuzara, Jesús López-Belmonte, José-Antonio Marín-Marín and Antonio-José Moreno-Guerrero

Sustainability **2021**, *13*(10), 5452; **https://doi.org/10.3390/su13105452** - 13 May 2021

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Abstract COVID-19 has produced a transformation in society that has, in turn, influenced the field of education. The purpose of this study was to analyze the influence of COVID-19 on education using the Web of Science database. A methodology based on bibliometrics was used. [...] Read more.

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Determining the Impact of High Residential Density on Indoor Environment, Energy Use, and Moisture Loads in Swedish Apartments-and Measures for Mitigation

by Akram Abdul Hamid, Jenny von Platten, Kristina Mjörnell, Dennis Johansson and Hans Bagge
Sustainability **2021**, *13*(10), 5446; **https://doi.org/10.3390/su13105446** - 13 May 2021
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Abstract Recently, there has been an increase in apartments with a large number of inhabitants, i.e., high residential density. This is partly due to a housing shortage in general but also increased migration, particularly in suburbs of major cities. This paper specifies issues that [...] Read more.
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Research on the Relationship between Shared Leadership and Individual Creativity-Qualitative Comparative Analysis on the Basis of Clear Set

by Muyun Sun, Jigan Wang and Ting Wen
Sustainability **2021**, *13*(10), 5445; **https://doi.org/10.3390/su13105445** - 13 May 2021
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Abstract Creativity is the key to obtaining and maintaining competitiveness of modern organizations, and it has attracted much attention from academic circles and management practices. Shared leadership is believed to effectively influence team output. However, research on the impact of individual creativity is still [...] Read more.
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How Do Rural Communities Sustain Sanitation Gains? Qualitative Comparative Analyses of Community-Led Approaches in Cambodia and Ghana

by Jessica Tribbe, Valentina Zuin, Caroline Delaire, Ranjiv Khush and Rachel Peletz
Sustainability **2021**, *13*(10), 5440; **https://doi.org/10.3390/su13105440** - 13 May 2021
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Abstract Community-led Total Sanitation (CLTS) is a popular intervention for eliminating open defecation in rural communities. Previous research has explored the contextual and programmatic factors that influence CLTS performance. Less is known about the community-level conditions that sustain latrine coverage and use. We hypothesized [...] Read more.

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Impacts of Foreign Direct Investment and Industrial Structure Transformation on Haze Pollution across China

by Chenggang Li, Tao Lin, Zhenci Xu and Yuzhu Chen
Sustainability **2021**, *13*(10), 5439; **https://doi.org/10.3390/su13105439** - 13 May 2021
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Abstract With the development of economic globalization, some local environmental pollution has become a global environmental problem through international trade and transnational investment. This paper selects the annual data of 30 provinces in China from 2000 to 2017 and adopts exploratory spatial data analysis [...] Read more.

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Analyzing the Patterns, Trends and Dynamics of the Land-Use Changes in Azores Region: From 1990 to 2018

by Rui Alexandre Castanho, José Manuel Naranjo Gómez, Gualter Couto, Pedro Pimentel, Áurea Sousa and Maria da Graça Batista

Sustainability **2021**, *13*(10), 5433; **https://doi.org/10.3390/su13105433** - 13 May 2021

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Abstract The remarkable richness and singularity of the Azorean Region (located 38° North) and its landscapes require a sharp, well-defined, and comprehensive planning policy. Bearing in mind the significance of this issue in the enlightenment of sustainability, planning strategies should be based and supported [...] Read more.

(This article belongs to the Special Issue Environmental Sustainability of Contemporary Land Use Change)

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Insight into the Composition of the Stabilized Residual from a Full-Scale Mechanical-Biological Treatment (MBT) Plant in Terms of the Potential Recycling and Recovery of Its Contaminants

by Katarzyna Bernat, Irena Wojnowska-Baryła, Magdalena Zaborowska and Izabela Samul

Sustainability **2021**, *13*(10), 5432; **https://doi.org/10.3390/su13105432** - 12 May 2021

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Abstract There is a lack of knowledge about the composition and particle size distribution of the <80 mm fraction mechanically separated from residual municipal solid waste (rMSW) and the stabilized residual (SR) after aerobic stabilization in a full-scale MBT plant. Therefore, the composition of [...] Read more.

(This article belongs to the Special Issue Wastewater Treatment and Solid Waste Management)

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The Effects of Psychological Capital and Internal Social Capital on Frontline Hotel Employees' Adaptive Performance

by Cheng-Yi Luo, Chin-Hsun (Ken) Tsai, Ming-Hsiang Chen and Jun-Li Gao

Sustainability **2021**, *13*(10), 5430; **https://doi.org/10.3390/su13105430** - 12 May 2021

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Abstract This study examines the relationship between psychological capital, social capital, and adaptive performance in China's lodging industry. Recent research has revealed that the production attributes of internal social capital can explain adaptive performance, and that psychological capital affects the relationship attributes of social [...] Read more.

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Growth and Physiological Responses of Three Landscape Plants to Calcium Chloride

by Kei-Jung Kwon, Jaehyuck Choi, Sang-Yong Kim, Na-Ra Jeong and Bong-Ju Park

Sustainability **2021**, *13*(10), 5429; **https://doi.org/10.3390/su13105429** - 12 May 2021

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Abstract The objective of this study was to analyze the effects of calcium chloride ($CaCl_2$) used as a de-icing agent on growth and physiological responses of three ground cover plants, *Hosta longipes*, *Iris ensata*, and *Iris pseudacorus*. $CaCl_2$ [...] Read more.

(This article belongs to the Special Issue Development of Green Infrastructure Design for Sustainable Social-Ecological System)

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Post-Emergence Herbicides for Effective Weed Management, Enhanced Wheat Productivity, Profitability and Quality in North-Western Himalayas: A 'Participatory-Mode' Technology Development and Dissemination

by Anil K. Choudhary, D.S. Yadav, Pankaj Sood, Shakuntla Rahi, Kalpana Arya, S.K. Thakur, Ramesh Lal, Subhash Kumar, Jagdev Sharma, Anchal Dass, Subhash Babu, R.S. Bana, D.S. Rana, Adarsh Kumar, Sudhir K. Rajpoot, Gaurendra Gupta, Anil Kumar, Harish M.N., A.U. Noorzai, G.A. Rajanna, Mohammad Halim Khan, V.K. Dua and Raj Singh

Sustainability **2021**, *13*(10), 5425; **https://doi.org/10.3390/su13105425** - 12 May 2021

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Abstract 'Participatory-mode' adaptive research was conducted in wheat in north-western Himalayas (NWH) during 2008–2014 to develop an improved chemical weed management (ICWM) technology. First of all, two years 'on-farm experimentation' was performed in a randomized block design at 10 locations in NWH using seven [...] Read more.

(This article belongs to the Special Issue Soil Health Restoration and Environmental Management)

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Assessment of Tuscany Landscape Structure According to the Regional Landscape Plan Partition

by Martina Venturi, Francesco Piras, Federica Corrieri, Beatrice Fiore, Antonio Santoro and Mauro Agnoletti

Sustainability **2021**, *13*(10), 5424; **https://doi.org/10.3390/su13105424** - 12 May 2021

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Abstract The landscape is considered a strategic asset by the Tuscan regional government, also for its economic role, meaning that a specific Landscape Plan has been developed, dividing the region into 20 Landscape Units and representing the main planning instrument at the regional level. [...] Read more.

(This article belongs to the Special Issue Identification and Assessment of Landscape Change and Landscape Services for Sustainable Landscape Planning and Management)

Sustainability of Global Economic Policy and Stock Market Returns in Indonesia

by Shabir Mohsin Hashmi, Muhammad Akram Gilal and Wing-Keung Wong

Sustainability **2021**, *13*(10), 5422; **https://doi.org/10.3390/su13105422** - 12 May 2021

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Abstract Interdependence in trade and financial globalization has increased the vulnerability of developed and developing countries to external shocks alike, whereas emerging markets are more vulnerable to the shocks originating from the world's leading economies. This paper investigates the impact of the uncertainty from [...] Read more.

(This article belongs to the Special Issue Behavioral Business and Behavioral Financial Economics with Applications)

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A Cellular Automata Agent-Based Hybrid Simulation Tool to Analyze the Deployment of Electric Vehicle Charging Stations

by Amaro García-Suárez, José-Luis Guisado-Lizar, Fernando Diaz-del-Rio and Francisco Jiménez-Morales

Sustainability **2021**, *13*(10), 5421; **https://doi.org/10.3390/su13105421** - 12 May 2021

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Abstract We present a hybrid model combining cellular automata (CA) and agent-based modeling (ABM) to analyze the deployment of electric vehicle charging stations through microscopic traffic simulations. This model is implemented in a simulation tool called SIMTRAVEL, which allows combining electric vehicles (EVs) and [...] Read more.

(This article belongs to the Special Issue Technologies for Sustainability in Smart Cities)

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Consumers' Willingness to Purchase Imported Cherries towards Sustainable Market: Evidence from the Republic of Korea

by Seongmin Shin and Seongtae Ji
Sustainability **2021**, *13*(10), 5420; **https://doi.org/10.3390/su13105420** - 12 May 2021
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Abstract Globalization has led diverse stakeholders to join the market and has resulted in corporate and product diversification; however, some markets remain monopolized by a few countries owing to "shadow trade barriers" influencing willingness to purchase. The Korean cherry market has grown rapidly since [...] Read more.
(This article belongs to the Special Issue Sustainable Food Management and Marketing)

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Perceived Sensory Dimensions of Green Areas: An Experimental Study on Stress Recovery

by Sanaz Memari, Mahdieh Pazhouhanfar and Patrik Grahn
Sustainability **2021**, *13*(10), 5419; **https://doi.org/10.3390/su13105419** - 12 May 2021
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Abstract Natural environments have been shown to promote health, and are, therefore, important for achieving social sustainability in cities. As cities grow and become denser, it is important to develop knowledge about the characteristics of natural environments that work to promote health. Perceived Sensory [...] Read more.
(This article belongs to the Special Issue Landscape Architecture Design to Promote Well-Being)

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(Re-)Defining Permaculture: Perspectives of Permaculture Teachers and Practitioners across the United States

by Kaitlyn Spangler, Roslynn Brain McCann and Rafter Sass Ferguson
Sustainability **2021**, *13*(10), 5413; **https://doi.org/10.3390/su13105413** - 12 May 2021
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Abstract The solutions-based design framework of permaculture exhibits transformative potential, working to holistically integrate natural and human systems toward a more just society. The term can be defined and applied in a breadth of ways, contributing to both strengths and weaknesses for its capacity [...] Read more.
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SIRen: An Applied Framework for a Sustainable Renovation Process

by Petter Wallentén and Kristina Mjörnell
Sustainability **2021**, *13*(10), 5412; **https://doi.org/10.3390/su13105412** - 12 May 2021
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Abstract The renovation of buildings involves multidisciplinary issues and multistakeholder involvement, which makes the process complex to manage. The purpose of this paper is to present a transparent, openly accessible, adaptable framework to ensure a sustainable renovation process, covering the technical, environmental, economic, social, [...] Read more.
(This article belongs to the Special Issue Sustainability Assessment of Architecture, Construction, Refurbishment and Restoration)

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Effect of Visible Light on Surface-Attached and Suspended Heterotrophic Bacteria in a Typical Household Rainwater Harvesting Tank

by Vonihanitriniaina Andriamanantena R., Mikyeong Kim and Mooyoung Han
Sustainability **2021**, *13*(10), 5410; **https://doi.org/10.3390/su13105410** - 12 May 2021
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Abstract Rainwater harvesting (RWH) systems can be used to mitigate global water crises; however, they have been poorly received by communities because of the sub-standard quality of harvested water. Heterotrophic bacteria present in the water can degrade the water's microbiological quality and create health [...] Read more.

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Inspiriting Innovation: The Effects of Leader-Member Exchange (LMX) on Innovative Behavior as Mediated by Mindfulness and Work Engagement

by Rowan Mulligan, José Ramos, Pilar Martín and Ana Zornoza
Sustainability **2021**, *13*(10), 5409; **https://doi.org/10.3390/su13105409** - 12 May 2021
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Abstract Continuous innovation has become a key to gaining a sustainable competitive advantage for organizations in the 21st century. By focusing on the underlying mechanisms (i.e., mindfulness and work engagement) by which it works, this study addresses the quality of leader–member relationships and their [...] Read more.
(This article belongs to the Special Issue Sustainable Transformation and Innovation in Organization Management)

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Modeling the Influence of Roundabout Deflection on Its Efficiency as a Noise Abatement Measure

by Saša Ahac, Maja Ahac, Josipa Domitrović and Vesna Dragčević
Sustainability **2021**, *13*(10), 5407; **https://doi.org/10.3390/su13105407** - 12 May 2021
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Abstract Challenges that emerge in roundabout design are mostly related to space constrictions and provision of appropriate deflection around the central island. This can result in speed profiles on roundabouts that might reduce their potential as a noise abatement measure. Because of this, the [...] Read more.
(This article belongs to the Special Issue Roundabouts Performance in Road Transport Networks - Future Challenges, Problems and Issues)

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Innovative Artificial Intelligence Approach for Hearing-Loss Symptoms Identification Model Using Machine Learning Techniques

by Mohd Khanapi Abd Ghani, Nasir G. Noma, Mazin Abed Mohammed, Karrar Hameed Abdulkareem, Begonya Garcia-Zapirain, Mashael S. Maashi and Salama A. Mostafa
Sustainability **2021**, *13*(10), 5406; **https://doi.org/10.3390/su13105406** - 12 May 2021
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Abstract Physicians depend on their insight and experience and on a fundamentally indicative or symptomatic approach to decide on the possible ailment of a patient. However, numerous phases of problem identification and longer strategies can prompt a longer time for consulting and can subsequently [...] Read more.
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How Can Information Technology Use Improve Construction Labor Productivity? An Empirical Analysis from China

by Hao Lu, Qin Zhang, Qinghong Cui, Yuanyuan Luo, Pardis Pishdad-Bozorgi and Xiancun Hu
Sustainability **2021**, *13*(10), 5401; **https://doi.org/10.3390/su13105401** - 12 May 2021
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Abstract Labor productivity is a significant indicator to measure the sustainable development potential and competitiveness of the construction industry. Under the background of the integration of global construction industry and information and communication technology (ICT), the pursuit of the growth of construction labor productivity [...] Read more.

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Commercial Vacancy Prediction Using LSTM Neural Networks

by Jaekyung Lee, Hyunwoo Kim and Hyungkyoo Kim
Sustainability **2021**, *13*(10), 5400; **https://doi.org/10.3390/su13105400** - 12 May 2021
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Abstract Previous studies on commercial vacancy have mostly focused on the survival rate of commercial buildings over a certain time frame and the cause of their closure, due to a lack of appropriate data. Based on a time-series of 2,940,000 individual commercial facility data, [...] Read more.
(This article belongs to the Special Issue Sustainable Regeneration of Degraded Urban Structures and Fabric)

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Impact of Entrepreneurial Orientation on Innovation Capability: The Mediating Role of Absorptive Capability and Organizational Learning Capabilities

by Lahcene Makhloufi, Abderrazak Ahmed Laghouag, Alhussain Ali Sahli and Fateh Belaid
Sustainability **2021**, *13*(10), 5399; **https://doi.org/10.3390/su13105399** - 12 May 2021
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Abstract Learning and knowledge creation are acknowledged as crucial drivers associated with entrepreneurial orientation (EO) and innovation capability (IC). Absorptive capacity (AC) harmonizes internal innovation-building activities with external opportunities, while organizational learning capabilities (OLC) foster entrepreneurial cognitive skills and innovation capabilities. This study aims [...] Read more.
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Sustainable Meat: Looking through the Eyes of Australian Consumers

by Lívia Garcez de Oliveira Padilha, Lenka Malek and Wendy J. Umberger
Sustainability **2021**, *13*(10), 5398; **https://doi.org/10.3390/su13105398** - 12 May 2021
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Abstract Sustainability is a complex and multifaceted concept that comprises environmental, economic, social, and cultural dimensions. Growing consumer concerns over the impacts of global meat production and consumption have led to increasing interest in sustainability initiatives and the use of sustainability labels. Yet, an [...] Read more.
(This article belongs to the Special Issue Sustainable Agri-Food Systems)

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The Effect of Mobility on the Spread of COVID-19 in Light of Regional Differences in the European Union

by Ali Cheshmehzangi, Maycon Sedrez, Junhang Ren, Dezhou Kong, Yifan Shen, Sinan Bao, Junhao Xu, Zhaohui Su and Ayotunde Dawodu

Sustainability **2021**, *13*(10), 5395; **https://doi.org/10.3390/su13105395** - 12 May 2021

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Abstract The COVID-19 pandemic has spread rapidly all over the world, affecting many countries to varying degrees. In this study, an in-depth analysis of the factors influencing the spread of COVID-19 is offered mainly through big data in the European Union (EU) context. In [...] Read more.

(This article belongs to the Special Issue Spatiotemporal Effects of COVID-19 to Sustainable Regional Planning and Development)

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Production, Purification, and Characterization of Bacillibactin Siderophore of *Bacillus subtilis* and Its Application for Improvement in Plant Growth and Oil Content in Sesame

by S. Nithyapriya, Sundaram Lalitha, R. Z. Sayyed, M. S. Reddy, Daniel Joe Dailin, Hesham A. El Enshasy, Ni Luh Suriani and Susila Herlambang

Sustainability **2021**, *13*(10), 5394; **https://doi.org/10.3390/su13105394** - 12 May 2021

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Abstract Siderophores are low molecular weight secondary metabolites produced by microorganisms under low iron stress as a specific iron chelator. In the present study, a rhizospheric bacterium was isolated from the rhizosphere of sesame plants from Salem district, Tamil Nadu, India and later identified [...] Read more.

(This article belongs to the Special Issue Beneficial Microbes for Sustainable Agriculture)

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Economic Emission Dispatch Considering Renewable Energy Resources—A Multi-Objective Cross Entropy Optimization Approach

by Qun Niu, Ming You, Zhile Yang and Yang Zhang

Sustainability **2021**, *13*(10), 5386; **https://doi.org/10.3390/su13105386** - 12 May 2021

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Abstract The conventional electrical power system economic dispatch (ED) often only pursues immediate economic benefits but neglects the harmful environment impacts of gas emissions from thermal power plants. To address this shortfall, economic emission dispatch (EED) has drawn a lot of attention in recent [...] Read more.

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Transport Infrastructure and Political Factors as Determinants of Tourism Development in the Cross-Border Region of Bihor and Maramureş. A Comparative Analysis

by Jan A. Wendt, Vasile Grama, Gabriela Ilieş, Andrey S. Mikhaylov, Sorin G. Borza, Grigore Vasile Herman and Agnieszka Bógdał-Brzezińska

Sustainability **2021**, *13*(10), 5385; **https://doi.org/10.3390/su13105385** - 12 May 2021

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Abstract This article follows two important interconnected aspects. On one hand, it investigates whether the political factors represented by the presence of ethnic minorities can be a catalyst for tourism development in cross-border regions, in addition to the development of transport infrastructure. On the [...] Read more.

(This article belongs to the Special Issue Re-defining the Role of Transport in Sustainable Tourism Development)

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Integrating Social Innovation into the Curriculum of Higher Education Institutions in Latin America: Insights from the Students4Change Project

by Alfonso Unceta, Igone Guerra and Xabier Barandiaran
Sustainability **2021**, *13*(10), 5378; **https://doi.org/10.3390/su13105378** - 11 May 2021
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Abstract In the last two decades, social innovation (SI) and social entrepreneurship (SE) have gained relevance and interest within the framework of academia at international level. Higher education institutions (HEIs) are key players in promoting innovation and social entrepreneurship initiatives that respond to multifaceted [...] Read more.
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Understanding of Multicultural Sustainability through Mutual Acceptance: Voices from Intercultural Teachers' Previous Early Education

by Miftachul Huda, Mazlina Che Mustafa and Ahmad Kilani Mohamed
Sustainability **2021**, *13*(10), 5377; **https://doi.org/10.3390/su13105377** - 11 May 2021
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Abstract The objective of this article was to examine multicultural sustainability with reference to appropriate manners suitable for creating an atmosphere of mutual acceptability. The focus was on previous early education among the intercultural teachers. The participants included ten teachers, five Muslims and five [...] Read more.
(This article belongs to the Section Sustainable Education and Approaches)

Economic Valuation of Benefits in Freshwater Ecosystems: Complex Wetlands System Belonging to the San Juan River in the *Magdalena Medio* Region, Colombia

by Lya Sierra, Wilmer Marin, Luis Guillermo Castro and Olga Lucía Hernández-Manrique
Sustainability **2021**, *13*(10), 5374; **https://doi.org/10.3390/su13105374** - 11 May 2021
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Abstract This paper identifies and assesses the economic value of the main natural benefits relating to the complex system of wetlands (CSW) belonging to the San Juan River in the Colombian Magdalena Medio. This is a region rich in biodiversity and natural resources, which [...] Read more.
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Promoting Sustainable Creativity: An Empirical Study on the Application of Mind Mapping Tools in Graphic Design Education

by Yenan Dong, Shangshang Zhu and Wenjie Li
Sustainability **2021**, *13*(10), 5373; **https://doi.org/10.3390/su13105373** - 11 May 2021
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Abstract The development of creative thinking and creative problem solving is an important part of modern sustainable education. In teaching graphic design, educators should ensure the cultivation of sustainable creativity among students. Creative thinking and program development can be facilitated with the help of [...] Read more.
(This article belongs to the Special Issue Technology and Innovation Management in Education)

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Strategic Analysis of Dual-Channel Green Supply Chain with an Unreliable and Competitive Supplier

by Chongfeng Lan, Zhongzhen Miao and Huanyong Ji
Sustainability **2021**, *13*(10), 5371; **https://doi.org/10.3390/su13105371** - 11 May 2021
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Abstract With the increasing public awareness of environmental issues, green production has become an important issue for supply chain management. This study proposes an analytical model to investigate the dual-channel green supply chain decisions of a retailer and a competitive supplier; the latter suffers [...] Read more.

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Profitability Assessment of Residential Photovoltaic Battery Systems in Japan Using Electric Power Big Data

by Tomonori Honda, Akito Ozawa and Hiroko Wakamatsu
Sustainability **2021**, *13*(10), 5370; **https://doi.org/10.3390/su13105370** - 11 May 2021
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Abstract Residential photovoltaic (PV) battery systems are key technology in the design of low-carbon and resilient energy systems; however, limited research has assessed their profitability. This study aims to evaluate the economic performance of PV battery systems for end-users. The evaluation takes geological, technological, [...] Read more.

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Manure Flushing vs. Scraping in Dairy Freestall Lanes Reduces Gaseous Emissions

by Elizabeth G. Ross, Carlyn B. Peterson, Yongjing Zhao, Yuee Pan and Frank M. Mitloehner
Sustainability **2021**, *13*(10), 5363; **https://doi.org/10.3390/su13105363** - 11 May 2021
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Abstract The objective of the present study was to mitigate ammonia (NH_3), greenhouse gases (GHGs), and other air pollutants from lactating dairy cattle waste using different freestall management techniques. For the present study, cows were housed in an environmental chamber from which [...] Read more.
(This article belongs to the Special Issue Dairy Sector: Opportunities and Sustainability Challenges)

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Drunk Drivers' Willingness to Use and to Pay for Designated Drivers

by Rong-Chang Jou and Li-Wun Syu
Sustainability **2021**, *13*(10), 5362; **https://doi.org/10.3390/su13105362** - 11 May 2021
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Abstract While drunk driving accidents, which are a serious problem in Taiwan, have decreased in recent years, cases of drunk driving continue to emerge endlessly, and are a source of traffic risks even when the accidents cause no injuries. In order to prevent drunk [...] Read more.
(This article belongs to the Special Issue Driving Behavior and Road Safety)

Framework for Long-Term Public Housing Supply Plan Focusing on Small-Scale Offsite Construction in Seoul

by Hosang Hyun, Young-Min Lee, Hyung-Geun Kim and Jin-Sung Kim
Sustainability **2021**, *13*(10), 5361; **https://doi.org/10.3390/su13105361** - 11 May 2021
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Abstract The public housing demand in Seoul has been continuously increasing, but the available land for housing is insufficient. To meet the demand, the Seoul government is planning to develop small-scale housing in urban areas through various methods. Construction activities for increasing housing capacity [...] Read more.
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A Methodological Approach towards Sustainable Urban Densification for Urban Sprawl Control at the Microscale: Case Study of Tanta, Egypt

by Karim I. Abdrabo, Heba Hamed, Kareem A. Fouad, Mohamed Shehata, Sameh A. Kantoush, Tetsuya Sumi, Bahaa Elboshy and Taher Osman
Sustainability **2021**, *13*(10), 5360; **https://doi.org/10.3390/su13105360** - 11 May 2021
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Abstract When a high need for new residences coincides with an insufficient area of obtainable land within cities, urban sprawl occurs. Although densification is a well-known policy for controlling urban sprawl, one of the main challenges faced by researchers is that of determining urban [...] Read more.
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The Growth of E-Commerce Due to COVID-19 and the Need for Urban Logistics Centers Using Electric Vehicles: Bratislava Case Study

by Tomáš Settey, Jozef Gnap, Dominika Beňová, Michal Pavličko and Oľga Blažeková
Sustainability **2021**, *13*(10), 5357; **https://doi.org/10.3390/su13105357** - 11 May 2021
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Abstract Before the COVID-19 pandemic there had already been an increase in individual shipment transportation including inner-city areas. During the pandemic and implementation of adopted preventive measures, it has increased by more than 100% in some cities. This presents an unsustainable development, particularly in [...] Read more.
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Spatial Variability of Ozigo Wood Beams under Long-Term Loadings in Various Environmental Exposures

by Valérie Nsouami, Nicaise Manfoumbi, Rostand Moutou Pitti and Emilio Bastidas-Arteaga
Sustainability **2021**, *13*(10), 5356; **https://doi.org/10.3390/su13105356** - 11 May 2021
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Abstract Timber is a renewable material that should be more used for sustainable construction. While the mechanical behavior and durability of some species have been widely studied in the past, few studies are available for the Ozigo (*Dacryodes buettneri*) specie. This paper [...] Read more.
(This article belongs to the Section Sustainable Engineering and Science)

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The Drivers of Technological Eco-Innovation—Dynamic Capabilities and Leadership

by Magdalena Pichlak

Sustainability **2021**, *13*(10), 5354; **https://doi.org/10.3390/su13105354** - 11 May 2021

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Abstract In the paper, a theoretical framework that combines the multidimensional conceptualization of dynamic capabilities (sensing, seizing, and reconfiguring) with two leadership styles (transactional and transformational) and two types of eco-innovation (incremental and radical) was developed and empirically tested. The purpose of this study [...] Read more.

(This article belongs to the Special Issue Innovation for Sustainable Business)

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Sustainable Closed-Loop Mask Supply Chain Network Design Using Mathematical Modeling and a Fuzzy Multi-Objective Approach

by Roy Setiawan, Rabia Salman, Bari Galimovich Khairov, Valeriy Vasilyevich Karpov, Svetlana Dmitrievna Danshina, Lidia Vladimirovna Vasyutkina, Natalia Alekseevna Prodanova, Viacheslav Zhenzhebir, Evgeny Nuyanzin, Nadezhda Kapustina and Ali Hasanzadeh Kalajahi

Sustainability **2021**, *13*(10), 5353; **https://doi.org/10.3390/su13105353** - 11 May 2021

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Abstract The outbreak of the deadly coronavirus, which is increasing the number of victims every day, has created many changes in today's world. The use of various masks is the most important social tool against this virus. Given the importance of rapid and quality [...] Read more.

(This article belongs to the Special Issue Sustainable Global Supply Chain Management: From an International Perspective)

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Post-COVID 19 Tourism: Will Digital Tourism Replace Mass Tourism?

by Nadeem Akhtar, Nohman Khan, Muhammad Mahroof Khan, Shagufta Ashraf, Muhammad Saim Hashmi, Muhammad Muddassar Khan and Sanil S. Hishan

Sustainability **2021**, *13*(10), 5352; **https://doi.org/10.3390/su13105352** - 11 May 2021

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Abstract Recently, nations are struggling to mitigate the impact of the unprecedented COVID-19 outbreak on their economy. Many countries have imposed traveling restrictions to reduce people's movement in order to avoid infection transmission. Traveling restrictions have jeopardized the tourism industry around the globe. If [...] Read more.

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Examining the Factors That Affect the Preparation of Life after Retirement and Quality of Life of South Korean Adults across Different Age Groups

by Mi-Lyang Kim, Young-Han Lee and Seo-Youn Hong

Sustainability **2021**, *13*(10), 5351; **https://doi.org/10.3390/su13105351** - 11 May 2021

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Abstract The aim of the current study is twofold. First, a preliminary analysis was conducted to discover the important factors in terms of preparing for life after retirement across different South Korean age groups (i.e., the 30s, 40s, and 50s). In this process, the [...] Read more.

Welcome to the Regular World! Exploring How Female Doctorate Holders in Education Transition from Irregular to Regular Work in South Korea

by Hyosun Kim and Sooyong Lee
Sustainability **2021**, *13*(10), 5347; **https://doi.org/10.3390/su13105347** - 11 May 2021
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Abstract The purpose of this study was to explore the adaptation process of female Ph.D. holders working in universities who shifted from being irregular employees to regular employees. The study adopted a qualitative approach using in-depth interviews to investigate participants' experiences and discover any [...] Read more.
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A Quantitative Approach to Assessing the Technical and Economic Performance of Source Containment Options for Contaminated Aquifers

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Abstract To facilitate transition to a sustainable food system, it is necessary to address food losses. A large proportion of waste occurs during primary production, with large quantities of edible crop parts left in the field at harvest. One such product is broccoli, where [...] Read more.

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Impact of Internal Integration, Supply Chain Partnership, Supply Chain Agility, and Supply Chain Resilience on Sustainable Advantage

Zeplin Jiwa Husada Tarigan [1,*], Hotlan Siagian [1] and Ferry Jie [2]

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Abstract: The global order has suddenly changed due to the COVID-19 pandemic. Many countries, including Indonesia, have applied lockdown policies to stop the spread of COVID-19. Lockdown policies have disrupted the supply of raw materials and the demand for finished goods. The manufacturing industry is one of the sectors that has suffered most in this situation, and they have struggled to reconfigure their internal and external supply chain network and partnership. This study examined the impact of internal integration, supply chain partnership, supply chain agility, and supply chain resilience on sustainable advantage. The participants of this study were from manufacturing companies in Indonesia. For data collection, a questionnaire was used, with a five-point Likert scale to obtain the respondents' opinions. Using Google Form link, the questionnaire was distributed via email and the WhatsApp social media application to the predetermined set of manufacturing companies. Respondents filled out 672 questionnaires, and 456 respondents (corresponding to 67.86%) filled it out correctly and were considered valid for further analysis. Partial least squares (PLS) regression was used to analyze the data using the SmartPLS software version 3.3. The results supported all nine hypotheses proposed. Internal integration through interdepartmental data sharing affects supply chain (SC) partnerships, SC agility, and SC resilience. Moreover, SC partnerships, through the on-time delivery of materials and by coping with changing demand, improve SC agility, SC resilience, and sustainable advantages. SC agility, in keeping the production process running normally and regulating the production capacity, affects SC resilience and sustainable advantage. SC resilience improves sustainable advantage by providing timely product delivery and reliable sales volumes in pandemic conditions. These results provide insights for managers into enhancing the sustainable advantage by improving supply chain agility, supply chain resilience, and supply chain partnerships. This study could contribute and extend the acceptance of previous studies in the context of the manufacturing industry.

Keywords: internal integration; SC partnership; SC agility; SC resilience; sustainable advantage

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1. Introduction

The COVID-19 pandemic has caused sudden disruption and has affected all areas of life, including health services, and the economic, agriculture, education, sport, and manufacturing industries. As of 15 March 2021, COVID-19 has infected 119,603,761 people and 2,649,722 people have died, as stated by the World Health Organization [1]. In 2021, there has been a significant increase in cases, compared to the previous year. As of 11 March 2020, the world community had confirmed 118,000 people were infected and 4291 had died in 114 countries, as declared by the World Health Organization [2]. There has been a significant increase of more than 1000% within one year.

Many countries, including Indonesia, are trying to stop the spread of the COVID-19 pandemic by implementing a lockdown policy [3]. However, the implementation of

the lockdown has impacted the economic sector as well. For example, the Philippines experienced a significant decline of 16.5% GDP in the second quarter of 2020 due to the lockdown policy. An estimated economic loss of USD 42 billion was contributed to from the trade sector by 29.19%, the manufacturing sector by 13.11%, and the private sector by 13.11% [4]. One of the sectors suffering most from the COVID-19 pandemic is the manufacturing industry. The pandemic has disrupted the global manufacturing supply chain network, increased the lead time, and resulted in high uncertainties in supply and demand. The bullwhip effect, due to raw material supply disruptions, has made customers face scarcities of finished products. Manufacturing companies are trying to fulfill product demand quickly by increasing the number of products available [5]. The global pandemic has also significantly increased pharmaceutical product demand, such as drugs required for COVID-19 treatment, which have suddenly and continuously scaled up the supply chain challenges [6].

The COVID-19 pandemic has significantly created an imbalance between supply and demand. The imbalance between downstream (demand) and upstream (supply) affects the planning and production recovery plan model [7]. Changes to the upstream—or suppliers—include raw materials delivery, and to the downstream—or customers—include the finished goods flow, product loss, and even product scarcity [8]. In other words, COVID-19 has suddenly resulted in uncertainty about the supply and demand for manufacturing companies covering raw materials delivery and finished product demand with scarcity [3]. The imbalance between product demand and the availability of raw materials has affected companies' production process [7]. The global supply chain (SC) experienced rapid disruption due to the loss of raw materials and labor and has had a global impact [4]. COVID-19 resulted in many people losing their jobs and resulted in uncertainty between the supply and demand in the supply of clothing products [9]. Given this pandemic situation, manufacturing companies have no choice but to reconfigure their supply chain network capability in response to the high uncertainty in supply and demand. Many issues are emerging in the COVID-19 conditions, such as a lack of SC flexibility, a lack of government support, a lack of trust between suppliers and customers, a lack of security and safety, the imbalance between supply and demand, changes in consumer behavior, a lack of medical facilities, and a lack of access [10]. The COVID-19 pandemic requires companies to have SC resilience, the ability to provide products or services in safe and healthy conditions for the community, even in a time of crisis [11]. Furthermore, the current pandemic also requires companies to respond to external changes easily, quickly, and responsively, which is called the "agile supply chain." A company's ability to meet immediate customer demand changes by involving all internal functions of the company is called "supply chain (SC) agility" [12]. The rapid changes in the fashion industry have greatly determined companies' fast responses to building competitiveness [13]. Companies require collective capabilities between internal and external functions to provide accurate and quick responses to disrupted changes [14]. Collective capabilities are related to human resources and information resources within a single database that can integrate its internal capabilities [15]. Information technology owned by a company can provide effectiveness and efficiency in all activities and the supply chain flow. Internal integration in manufacturing companies can enhance the supply chain (SC) partnership to balance supply and demand [16].

Internal integration is a system that is implemented internally in a company to integrate all internal functions. Internal integration built at 539 Taiwanese third-party logistics (3PLs) companies impact SC partnerships with external integration, namely, customer and logistics collaboration integration [17]. Internal integration in manufacturing companies in Malaysia affects SC resilience [18]. Internal integration in companies is implemented by aligning business information systems at the operational level, namely, structural and social collaboration, to pursue increased organizational agility [19]. Information systems used in company operations to synchronize, manage, control, and fulfill demand, can increase SC agility [20]. Information sharing and supplier relationships in increasing supplier innova-

tiveness in manufacturing companies can impact the increase in SC agility [21]. Internal integration and external integration can improve company performance and generate sustainable advantages for fast-moving consumer goods companies [22]. SC integration and SC agility improve organization performance by producing new products and improving customer satisfaction as a sustainable advantage [14].

SC agility requires increased cooperation and dependence on supply chain partners to meet customer requirements with acceptance costs, and overall response time is minimized [19]. The supplier–buyer relationship enhances collaboration and improves organization agility [23]. The strategic partnership with external partners impacts the company's operational performance and competitive advantage [24–26]. The implementation of SC agility requires managers to know when to invest in resources, how much to invest, and where to invest in the supply chain flow to achieve improved performance [27]. SC agility can balance supply and demand to improve operational performance [28]. The company's SC agility, supported by its SC capability, can improve the company's competitiveness [29]. SC agility reduces instability and increases response to customers with rapid environmental changes [30,31]. Organizations that have good SC agility will be able to face disruption quickly. SC agility reflects the capability of the supply chain network to resolve the disruptions and return to normal conditions quickly in the supply chain flow process [32]. A company's goal should be how to survive and not be susceptible to disruption in the supply chain.

Furthermore, SC resilience is a company's capability to cooperate with its partners to resolve and recover from any unexpected disturbance and carry out normal activities in its operational functions and structures [33]. Operation capability related to resource planning, production capability in producing products, market the products, and use of resources will determine a manufacturing company's resilience [14]. A strong company can manage internal company resources and establish a good system to resolve any sudden emerging problem [34]. Companies always try to return to normal conditions quickly from sudden disruptions in the supply chain and with minimized consequences [35]. Exchange companies in Tehran, by building SC partnerships through trust and information sharing, affected the increase in SC resilience [36].

Meanwhile, SC partnerships in companies can increase supplier innovativeness and carry out strategic sourcing that can be implemented to impact SC resilience on an ongoing basis [37]. A survey of 207 supply chain professionals indicated that the relationship between SC partnerships and internal integration could balance supply and demand visibility and affect SC resilience significantly [16]. Big data analytics capability is moderated by organization flexibility and SC agility as a form of fast and responsive response to its functional recovery to increase organizational resilience and competitive advantage in India's automotive components manufacturers [38]. The SC resilience that companies achieve, along with SC integration, can impact their sustainable advantages through customer service and cost-efficient performance [18]. The conditions during the COVID-19 era required scarce raw material resources due to lockdowns in many countries [5]. The company's dependence on scarce resources that can be accessed, controlled, and utilized optimally can be a competitive advantage in the market [39]. A company's SC resilience deal with rapidly changing problems when returning to normal conditions. The condition of COVID-19 had a big impact and changed the manufacturing environment drastically. The ability of a company's management to maintain its readiness in response to disruption, quickly recover from disruption, and quickly return to normal conditions is a conceptualization of SC resilience [40]. SC resilience is a manifestation of maintaining the supply chain network, adapting, and recovering from disruption to meet customer needs and ensure company performance [41].

As discussed above, in this study, five constructs were selected from the literature, namely, internal integration, supply chain partnership, supply chain agility, supply chain resilience, and sustainable advantage. The reason for selecting those constructs is their relevancy with the current pandemic situation, characterized by disrupting supply and

demand and higher risk due to increasing uncertainty. Then, supported by previous studies, this research builds a model relating those constructs. Many studies have discussed the conceptual relationship between two or three of these constructs. However, to the best of the authors' knowledge, no study has dealt with these five constructs in one single model. This model aims to examine the effect of internal integration on sustainable advantage through the mediating role of SC partnership, SC agility, and SC resilience. Therefore, this research model raised three primary research questions. Firstly, it asks whether internal integration affects SC partnership, SC agility, and SC resilience. Secondly, it asks whether SC partnership, SC agility, and SC resilience improve sustainable advantage. Thirdly, it asks whether SC partnership, SC agility, and SC resilience mediate the influence of internal integration on sustainable advantage. This study used a quantitative research approach to examine and answer the research questions developed. Data collection used questionnaires, and data analysis used the partial least square (PLS) technique. The study is expected to provide managerial insights to help companies to recover from the disruption era caused by the COVID-19 pandemic. This study is also expected to enrich the current research in supply chain management.

The rest of the paper is organized as follows: Section 2 deals with the literature review, which explores previous studies to support and develop the research hypotheses. Section 3 is the research methodology, which describes the methodology used to collect and analyze the data obtained from respondents. Furthermore, Section 4 deals with data analysis and discussion to examine the hypotheses. Finally, Section 5 provides the conclusions and summarizes the main results and their relevance to the research questions.

2. Literature Review

2.1. Internal Integration

The adoption of information technology in companies allows for internal integration to provide flexibility, visibility, traceability, and reliability [10]. Internal integration is integration between departmental functions within the company [17]. A company's internal integration with information technology implementation is used for gathering data, processing information, and utilization [35]. Internal integration can access data information from other departments together and in real time [14]. Information obtained from information technology systems can support decision making. Internal integration is coordination between purchasing, production, manufacturing, finance, marketing, and other functions [18]. A company's information technology will build a strategic response to changes in upstream SC and strategic sensitivity in downstream SC and make it a collective capability [15]. Internal integration is built by one company by increasing the integration process. Process integration within the company is carried out by collaborative planning and trust development activities between internal functions [13]. Measurement items used to measure internal integration include smooth operation of data integration between departments (In.In1), quick coordination between departments with regard to changes (In.In2), quick confirmation of changes in data to other functions (In.In3), on-time integration of data during a pandemic (In.In4), and on-time access to company data for all departments (In.In5).

2.2. Supply Chain (SC) Partnership

Companies' ability to build SC partnerships is a good strategy for overcoming uncertainty conditions [24]. The SC partnership develops the needs for both parties' commitment between the supplier and the customer [42]. The conditions of clothing manufacturers in India during the COVID-19 pandemic showed that 72.1% of buyers refused to pay the cost of fabrics and used buyer's power so that suppliers would discount heavily, which is an unsustainable form of SC partnership [9]. Items determine SC partnership in the form of trust between the company and its suppliers, i.e., the customer is certain that the information submitted by the supplier is true and accurate, and the supplier fulfills the promises that have been made and provides the best assessment for the company that it can

rely on [36]. Strategic purchasing, determined by the company through conducting long-term contracts and jointly making long-term plans, affects its competitive advantage [26]. Supplier innovativeness is one of the impacts of SC partnerships to develop suppliers.

Furthermore, manufacturing companies achieve strategic sourcing that is implemented well [37]. The SC partnership that the company builds in the form of supplier–buyer collaboration can increase trust and ease of fulfilling product requirements [23,25]. The measures used for SC partnerships in the pandemic era are extra coordination with partners during a pandemic (SCP.1), on-time delivery of materials from suppliers (SCP.2), suppliers understanding order changes during a pandemic (SCP.3), suppliers' collaboration in helping companies during a pandemic (SCP.4), and coordinate activities with suppliers during the pandemic (SCP.5).

2.3. Supply Chain (SC) Agility

COVID-19 has resulted in the bullwhip effect in the supply chain of manufacturing companies, leading to the scarcity of finished products because the raw materials supply were limited due to lockdowns [5,8]. Pharmaceutical manufacturing companies whose products are badly needed need to pay attention to agility, resilience, and sustainability in producing drugs for the international community [6]. SC agility is a strategic capability established by the company to respond quickly to external changes in the company [12,29]. SC agility shows a company's ability to compile mindset, intelligence, and fast processes throughout the supply chain organization to respond to environmental uncertainty [43]. SC agility is the ability of a company to respond to changes easily and quickly, handling business changes with dexterity, and SC agility strategy is needed. The company's agility strategies include agility sensitivity, response, and collective capabilities [15]. Supply chain agility in fashion industry companies with high uncertainty in demand necessitate a quick response to market changes and accurate forecasting of heterogeneous customer needs [13]. SC agility is a company's tactic in carrying out operations to provide a fast response to the market at an efficient cost [27,41]. The SC agility is assessed using five indicators, namely, the production process runs normally during a pandemic to fulfill orders (SCA.1), production capacity is adjusted to pandemic conditions (SCA.2), production planning changes quickly to adjust to conditions during a pandemic (SCA.3), production processes change rapidly according to needs during a pandemic (SCA.4), and the work system is adjusted rapidly according to government regulations (SCA.5).

2.4. Supply Chain (SC) Resilience

Supply chain managers who focus on cost savings of 5–10% for logistics or purchasing costs in companies experience a change in focus when COVID-19 seeks to build an integrated system, improve total costs, and resilience [5]. Organizational resilience is the ability of a company to manage human resources properly and have a reliable system in overcoming disruptions in the supply chain [17,34]. Reducing diversification products can increase supply chain resilience for effective and efficient company production [3]. SC resilience is the company's ability to normalize by improving operations after a disruption occurs. Companies' supply chain resilience that needs to be considered is durability based on the number of products shipped and durability based on the average delivery distance [32]. SC resilience can be measured by redundancies, real-time monitoring, visibility systems, and recovery plans [11]. SC resilience is also the company's resilience in facing the disruption that occurs to return to its initial state or even much better than the previous state [30,31]. SC resilience is a company's ability to respond quickly to vulnerabilities and disruptions in the supply chain and return to normal conditions after it occurs [18,41]. SC resilience, as a supply chain system, shapes the company's ability to reduce the possibility of disruption and the consequences of such disruption after it occurs and reduces the time to restore normal performance [35]. In this study, SC resilience is defined as manufacturing companies' ability to identify risks, improve their impacts, and quickly return to normal conditions from the disruption of COVID-19. Items that measure SC resilience include the

ability to overcome SC disruption, easily adapt to SC disruption, respond quickly to SC disruption, and maintain high situational awareness [17]. The research indicators used to measure SC resilience are that the company maintains a buffer stock during a pandemic (SCR.1), production capacity remains a priority during a pandemic (SCR.2), the company can still serve customer demands during a pandemic (SCR.3), and the company continues to adapt quickly during a pandemic (SCR.4).

2.5. Sustainable Advantage

A sustainable advantage is a company's capability to achieve a value creation strategy based on its unique capabilities and competencies. The competitive advantage that a company has is different from the company's performance, but competitiveness is the obtained results from the continuous performance that has been achieved [44]. The sustainable advantage is the company's long-term competitiveness that has been recognized by customers, accepted by the market, and able to compete with competitors' products [26]. Companies are always trying to produce new products or redesign new products and redesign the roles of supply chain components in determining inventory and customer needs to improve operating performance and have a continuous competitive advantage [39]. The indicators set for sustainable advantage in the COVID era are that sales volumes are reliable compared to competitors in pandemic conditions (SA.1), product quality can be maintained during a pandemic (SA.2), products are delivered on time during a pandemic (SA.3), production costs are affordable compared to competitor products during a pandemic period (SA.4), and company profits can be relied on during the pandemic (SA.5).

2.6. Relationship between Research Concepts

2.6.1. Internal Integration, Supply Chain Partnerships, Supply Chain Agility, and Resilience

Internal integration is built in the company so that it can collaborate with suppliers and customers. Internal integration in 539 Taiwanese third-party logistics (3PLs) positively impacts customer integration and logistics collaborator integration [17]. Companies' information technology to carry out internal integration impacts SC partnerships related to the flow of raw materials and information sharing [35]. Internal integration formed in a company can connect the company and its suppliers to SC partnership [42]. Internal integration in manufacturing companies that have implemented enterprise resources planning (ERP) as a single database system can impact companies in coordinating and integrating with suppliers to determine a purchasing strategy [26].

Internal integration that occurs in the company will provide rapid coordination of company operations. The characteristics that need to be improved in a company's internal communication is integrating the internal information to improve SC agility in terms of collaborative planning, service level improvement, trust development, improved data accuracy, and increased information technology tools utilization [13]. The company's information system is related to fast decision making by evaluating, adopting, and implementing new technology to increase SC agility [20]. The agility of the system is built internally with resources, a lean organizational structure, and a concise operational system with information technology that can respond quickly to external changes [43]. Information systems in business can build alignment at the level of company operations with components in the supply chain, especially in internal integration, to increase organizational agility [19]. Companies' information sharing between 272 supply and purchasing executives in manufacturing companies impacts the increase in SC agility [21]. Internal integration is built by the company through communication and coordination of company goals and priorities with a formal schedule of regular meetings, which can quickly respond and build company resilience [18].

The company's ability to reconfigure internal resources to respond to environmental changes quickly impacts the increase in SC resilience [34]. Internal integration between the company's functions, including purchasing, manufacture, marketing, finance, can

regularly coordinate to determine company goals to increase SC resilience [18]. Internal integration proposed in gathering data, processing information, and utilization is related to its SC resilience [35]. The integration quality obtained in the logistics services supply chain can positively impact SC resilience [33]. Information sharing is an important factor for businesses to increase SC resilience [40]. Internal integration in sharing information among company members, as a support strategy for better management, can increase SC resilience [31,41]. Based on the relationship between these concepts, three research hypotheses can be established:

Hypothesis 1 (H1). *Internal integration has an impact on SC partnerships in manufacturing companies.*

Hypothesis 2 (H2). *Internal integration has an impact on SC agility in manufacturing companies.*

Hypothesis 3 (H3). *Internal integration has an impact on SC resilience in manufacturing companies.*

2.6.2. Supply Chain Relationship Partnership, Supply Chain Agility, and Supply Chain Resilience

The company's ability to involve SC partnerships in meeting customer needs and responding quickly to changes in the external environment is also known as increasing SC agility [43]. A good relationship between supply and demand in the company can mediate between SC agility and operational performance [28]. The company's ability to perform demand sensing by assimilating and transforming information into a company mindset and culture can increase SC agility [20]. SC partnerships with suppliers are needed to build strong cooperation to meet customers' requirements [19,24]. Companies need to increase their capability level by collaborating with channel partners in responding to rapid market changes as a form of the company's SC agility [21]. The company's ability to build collaborative supplier–buyer relationships as a practice of SC partnerships impacts SC agility performance [23].

Customer integration and supplier integration as a form of SC partnership can impact the increase in SC resilience with preparations used to overcome uncertainty and respond quickly to supply chain disruptions [18]. SC collaboration, as a company's ability to deliver products in a short lead time in the model, positively affects SC resilience [31]. Trust in SC partnerships positively impacted SC resilience through information sharing between 330 production companies in Tehran's exchange companies [36]. SC partnerships that have long been formed in companies with increasing innovativeness suppliers can impact SC resilience because the company has sufficient capacity to operate normally and has strong relationships with partners so that it is easy to return to its previous condition [37]. Based on the explanation of the relationship between the concepts above, two research hypothesis can be formulated as follows:

Hypothesis 4 (H4). *SC partnership affects SC agility in manufacturing companies.*

Hypothesis 5 (H5). *SC partnership influences SC resilience in manufacturing companies.*

2.6.3. Supply Chain Agility Relationship to Supply Chain Resilience

The company's ability to respond quickly to external changes can increase its recovery and resilience [12]. The company's readiness and the speed of its response to change define the company's SC agility so that it can quickly return to normal and grow quickly, which is a concept of SC resilience [40]. Companies build SC agility to respond quickly to dynamic market changes and uncertain environmental changes, increasing organizational resilience in Pakistan's manufacturing companies [30]. SC agility, as a company's ability to deliver products in a short lead time in the model, positively affects SC resilience [31].

Hypothesis 6 (H6). *SC agility affects SC resilience in manufacturing companies.*

2.6.4. Relationship of Supply Chain Partnerships, Agility, and Resilience to Sustainable Advantage

The company's SC partnership, by developing customer integration and supplier integration, affects its performance in terms of customer service, cost efficiency, and flexibility, which increased sustainable advantage in manufacturing companies in Malaysia [18]. With SC partnerships, supply risk management impacted sustainable competitive advantage in 300 manufacturing companies [44]. Innovative suppliers in manufacturing companies state that suppliers' innovations contribute to companies in introducing new products and services and aggressively marketing innovative services that increase sustainable advantage [37].

COVID 19 resulted in natural SC agility due to an imbalance in supply and demand. Availability of raw materials and loss of products for customers led to changes in company work patterns that focus on efficiency and effectiveness to reduce production costs in mass production in the short term to meet market needs [5]. COVID-19 affects companies, requiring them to build SC agility to recover quickly and devise a plan for maintaining company operations and performance after a disruption [11]. SC agility is a form of internal capability and external partner suppliers or customers to adapt quickly to market changes [43]. SC agility in the fashion industry is needed to respond quickly to changes in customer needs and carry out a high degree of maneuverability to have competitiveness [13]. SC agility, carried out by managers in 3058 manager companies in the USA, impacted customer response and cost efficiency [27]. Company performance can be improved by implementing SC agility to increase 121 professional supply chain management practitioners [28]. The company's SC agility can impact its competitive advantage [38]. SC agility in the company leads to a fast and responsive response to customer needs in a fast change and maintains a dynamic environmental balance to increase company competitiveness [30].

SC resilience applied to Taiwanese companies with a fast response and adaptability to SC disruption reduced complaints from customers and increased customer satisfaction, thereby increasing sustainable advantage [17]. The company's SC resilience impacts sustainable advantage by improving its performance in terms of customer service and cost efficiency but does not impact flexibility [18]. Analytics of capabilities in companies can be strengthened by organizational flexibility, and SC agility, as a form of a company's ability in SC resilience, affects increasing competitive advantage [38]. Companies that are already operating and performing better will have good resilience and contribute to manufacturing companies' competitive advantage [44]. SC resilience can positively impact the company, especially on the production process's sustainability [40]. Based on the results of the explanation on the relationship between concepts, three research hypothesis can be determined as follows:

Hypothesis 7 (H7). *SC partnerships influence sustainable advantage in manufacturing companies.*

Hypothesis 8 (H8). *SC agility has an impact on sustainable advantage in manufacturing companies.*

Hypothesis 9 (H9). *SC resilience affects sustainable advantage in manufacturing companies.*

Internal integration is an information technology system applied to companies capable of being integrated with SC partnerships to form SC integration [22]. It is defined as the company's ability with its partners to produce SC agility that can respond quickly to a change. The company's speed and reliability in responding to changes in the external environment can achieve SC resilience and sustainable advantage. Based on the explanation of the relationship between concepts, a conceptual research model is presented in Figure 1.

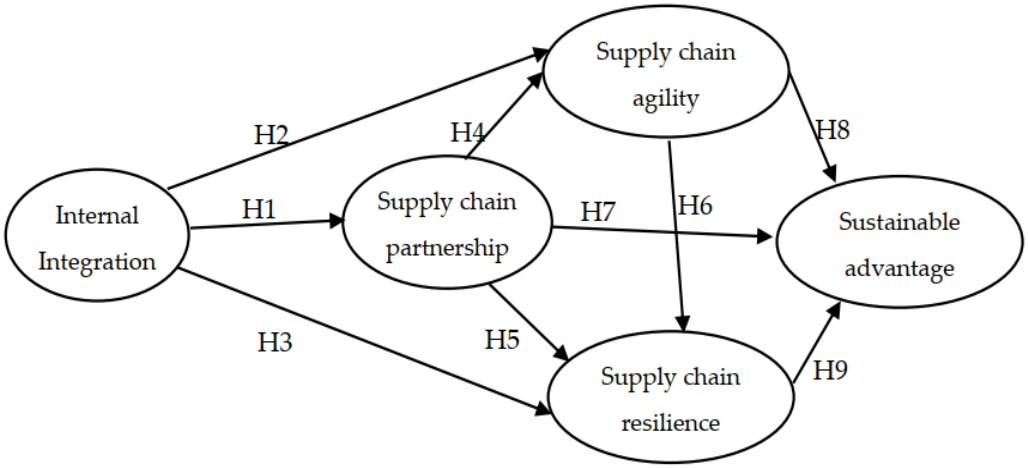

Figure 1. Model of SC internal integration, partnership, agility, resilience, and sustainable advantage.

3. Research Methodology

3.1. Data

The population of this study is composed of manufacturing companies in Indonesia, and the respondents are the management level of the companies. Data collection used a questionnaire based on a five-point Likert scale with 1: strongly disagree, 2: disagree, 3: neutral, 4: agree, and 5: strongly agree [45]. As described in the literature review, measurement indicators were adopted from previous research and adapted to the conditions of the COVID era. The internal integration consists of five indicators, SC partnership consists of five indicators, SC agility has five indicators, SC resilience consists of four indicators, and the sustainable advantage has five indicators. The measurement indicators were initially tested for validity and reliability before distributed to the respondents. This initial test was conducted by the production and operational management students who understood the manufacturing and industry practitioners. The initial version of the test was improved considering the feedback of the validation stage. The revised questionnaire was created using Google Form, and the link was distributed to Indonesia's industry practitioners between March 2020 and November 2020. The dissemination is conducted by sending a link via email to the manager's association assisted by several enumerators and a WhatsApp group by utilizing relationships in the manufacturing industry. Data collection received as many as 672 respondents who filled out the questionnaire, and 512 of the 672 questionnaires were related to the manufacturing companies, while the rest, 160 questionnaires, were services companies. Further data screening results in only 456 questionnaires (corresponding to 67.86%) considered valid for further analysis.

3.2. Validity and Reliability

The data were analyzed using the partial least square (PLS). PLS is broadly used in the quantitative research approach. This technique is a variance-based approach instead of covariance-based used in the SPSS technique. PLS performs the analysis in two steps: First, it assesses the measurement model and examines the inner model. Measurement model assessment verifies whether the indicators of each variable are valid and reliable against the predetermined acceptable values. The inner model assessment examines whether the proposed hypothesis is supported or not. The validity and reliability of the indicators are assessed using factor loading and cross-loading, while reliability is assessed using the composite reliability, average variance extracted (AVE), and Cronbach alpha. An indicator is considered valid when the factor loading value exceeds 0.50, and the cross-loading is less than factor loading.

In the second step, each variable's block of indicators is considered reliable when the composite reliability exceeds 0.70, AVE exceeds 0.50, and Cronbach alpha exceeds 0.70. Table 1 demonstrates the measurement model analysis results. The lowest loading factor

is obtained in the internal integration variable with the item In.In5 (all departments can access company data in real time), with the value of 0.554; SC partnership has the lowest loading factor for SCP1 items (extra coordination with partners during the pandemic), with the value of 0.602; SC agility has the lowest loading factor on items SCA.5 (work is adjusted quickly based on government regulations), with the value of 0.632; SC resilience has the lowest loading factor on item SCR.1 (the company maintains a buffer stock during the pandemic), with the value of 0.599; and lastly, the sustainable advantage has the lowest loading factor on item SA.1 (sales volume reliable compared to competitors in pandemic conditions), with the value of 0.585. The loading factor's result is greater than 0.500, and the loading factor's value is larger than its cross-loading with other variables [46]. Hence, those indicators are considered valid.

Table 1. Indicator factor loading and cross-loading assessment.

Indicator	Internal Integration	SC. Partnership	SC. Agility	SC. Resilience	Sustainable Advantage
In.In1	0.867	0.567	0.537	0.534	0.575
In.In2	0.834	0.644	0.486	0.520	0.556
In.In3	0.845	0.579	0.522	0.576	0.525
In.In4	0.795	0.551	0.503	0.538	0.483
In.In5	0.554	0.393	0.333	0.405	0.323
SCP.1	0.559	0.602	0.359	0.477	0.523
SCP.2	0.455	0.733	0.457	0.453	0.418
SCP.3	0.537	0.797	0.478	0.447	0.455
SCP.4	0.452	0.704	0.399	0.402	0.338
SCP.5	0.547	0.812	0.466	0.501	0.495
SCA.1	0.365	0.350	0.774	0.449	0.262
SCA.2	0.362	0.348	0.768	0.447	0.264
SCA.3	0.400	0.437	0.723	0.383	0.398
SCA.4	0.459	0.441	0.743	0.392	0.401
SCA.5	0.569	0.517	0.632	0.472	0.511
SCR.1	0.343	0.363	0.263	0.599	0.28
SCR.2	0.421	0.398	0.363	0.697	0.337
SCR.3	0.551	0.539	0.509	0.771	0.651
SCR.4	0.544	0.486	0.524	0.817	0.567
SA.1	0.309	0.247	0.257	0.267	0.585
SA.2	0.537	0.502	0.480	0.566	0.803
SA.3	0.536	0.498	0.489	0.567	0.689
SA.4	0.426	0.458	0.252	0.471	0.713
SA.5	0.304	0.345	0.258	0.353	0.663

Table 2 shows that the Cronbach's alpha value and composite reliability of all research variables are above 0.700, and the average variance extracted (AVE) value is above 0.500 [46]. Cronbach's alpha value, composite reliability, and average variance extracted (AVE) have met reliable requirements. Then, those indicators of variables are considered reliable, and further analysis can proceed.

Table 2. Reliability test results.

Research Variable	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Internal Integration	0.840	0.889	0.620
Supply Chain Agility	0.782	0.850	0.533
Supply Chain Partnership	0.781	0.852	0.538
Supply Chain Resilience	0.711	0.815	0.527
Sustainable Advantage	0.739	0.822	0.482

The goodness of fit test is required to seek whether the model as a whole could match the data obtained. The goodness of fit used the Q^2 (called predictive relevance) to assess it. The Q^2 is calculated using the following formula: $Q^2 = [1 - (1 - R_1{}^2)(1 - R_2{}^2)(1 - R_3{}^2)(1 - R_4{}^2)$. The Q^2 value using the R^2 in Table 3 resulted in $Q^2 = [1 - (1 - 0.426) \times (1 - 0.493) \times (1 - 0.521) \times (1 - 522)] = 0.9334$. The model has a good predictive relevance when the Q^2 value greater than 0.00. This result shows that the model can predict the sustainable advantage very well. In summary, the requirements for using all research constructs have met the predetermined requirements, and hypothesis examination can proceed.

Table 3. R square assessment results.

Variable	R Square	R Square Adjusted
Supply Chain Agility	0.426	0.424
Supply Chain Partnership	0.493	0.492
Supply Chain Resilience	0.521	0.517
Sustainable Advantage	0.522	0.519

4. Data Analysis and Discussion

4.1. Results

There are 456 questionnaires considered valid for analysis, and the respondents' profile is demonstrated in Table 4. Most of the respondents (80%) are located in Java island, while the rest are located in Sumatera, Kalimantan, Sulawesi, Nusa Tenggara, and Papua.

Table 4. Respondents' profile.

Criteria	Description	Number	%
Gender	Male	300	66
	Female	156	34
Department	Production	150	33
	Marketing	137	30
	Finance/Accounting	86	19
	Purchasing	26	6
	Warehouse	21	5
	Planning Production Control	19	4
	Supply Chain Management	10	2
	IT Department	6	1
Position	Lower-Level Management (Foreman level)	148	33
	Middle Management (Department head)	192	42
	Top Management (General Manager, Director, and Owner)	116	25
Length of work	Less than two years	68	15
	2–5 years	126	28
	5–10 years	72	16
	10–15 years	36	8
	More than 15 years	154	33
Company size (number of employees)	Small size (<20 employees)	104	23
	Middle size (20–100 employees)	233	51
	Large size (>100 employees)	119	26

Based on the gender, it was found that the respondents consist of 66% male and 34% female, which means that men dominate the employee working in the manufacturing companies. The respondents are in charge of various departments, including production (33%), marketing (30%), finance/accounting (19%), purchasing (6%), warehousing, PPC, supply chain management, and IT (12%). This department's composition indicated that respondents covered all the internal functions of an organization. The position of the respondents shows a balance between the lower level (32%), middle management (42%),

and top management level (25%), thus indicating their respective roles in the supply chain based on individual roles and functions. Based on the length of work, most of the respondents have working experience of more than two years (85%), which shows that employees have understood the company's working system well and are eligible to answer questionnaires. Most of the companies are of medium and large size since 77% have more than 20 workers.

A hypothesis is accepted when the t-statistic value of the path coefficient exceeds 2.36 for a significant level of 1% or 1.96 for the significant level of 5%, and 1.65 for the significance level at 10%. This study considers that the path coefficient with a significant 10% or t value level greater than 1.64 is acceptable. Table 5 shows that the minimum value of the t-statistic is 1.919, which means that this study supports all nine hypotheses proposed. The result supported eight hypotheses with a significant level of 1%, while one hypothesis (H8) with a significant level of 10%. However, Table 5 and Figure 2 demonstrate the only direct relationship of each two consecutive constructs. Simultaneously, the research model presents three intervening variables that mediate internal integration influence on sustainable advantage. Based on these findings, this result reveals that internal integration only affects the sustainable advantage through the mediating role of the three intervening variables, namely, SC agility, SC partnership, and SC resilience.

Table 5. Path coefficients.

Direct Effect	Original Sample	Standard Deviation	t-Statistics
Internal Integration -> Supply Chain Partnership (H1)	0.702	0.028	25.203
Internal Integration -> Supply Chain Agility (H2)	0.387	0.056	6.847
Internal Integration -> Supply Chain Resilience (H3)	0.333	0.054	6.190
Supply Chain Partnership -> Supply Chain Agility (H4)	0.321	0.053	6.019
Supply Chain Partnership -> Supply Chain Resilience (H5)	0.247	0.055	4.468
Supply Chain Agility -> Supply Chain Resilience (H6)	0.246	0.044	5.620
Supply Chain Partnership -> Sustainable Advantage (H7)	0.285	0.047	6.063
Supply Chain Agility -> Sustainable Advantage (H8)	0.097	0.051	1.919
Supply Chain Resilience -> Sustainable Advantage (H9)	0.436	0.044	9.836

The first hypothesis (H1), internal integration affects SC partnerships in manufacturing companies, is supported as the t-statistic value is 25.203. The second hypothesis (H2), internal integration influences SC agility, is supported in manufacturing companies with the t-statistic value is 6.847. The third hypothesis (H3) that internal integration affects SC resilience is accepted since the t-statistic value is 6.190.

The fourth hypothesis (H4) testing indicated a t-statistic of 6.019, which means the hypothesis is accepted, i.e., SC partnership affects SC agility in manufacturing companies. The fifth hypothesis (H5), with a t-statistic (4.468), is also accepted, i.e., SC partnership has an impact on SC resilience in manufacturing companies. The sixth hypothesis (H6) with a t-statistic of 5.620 is accepted, which means that SC Agility impacts SC resilience in manufacturing companies. The seventh hypothesis (H7), with a t-statistic of 6.063, is also supported, i.e., SC partnerships impact sustainable advantage in manufacturing companies. The eighth hypothesis test (H8) obtained a t-statistic value of 1.919; therefore, it is supported that SC agility has an impact on sustainable advantage in manufacturing companies at the level of significance 0.1. The ninth hypothesis (H9), with a t-statistic of

9.836, is supported, namely, that SC resilience has an impact on sustainable advantage in manufacturing companies.

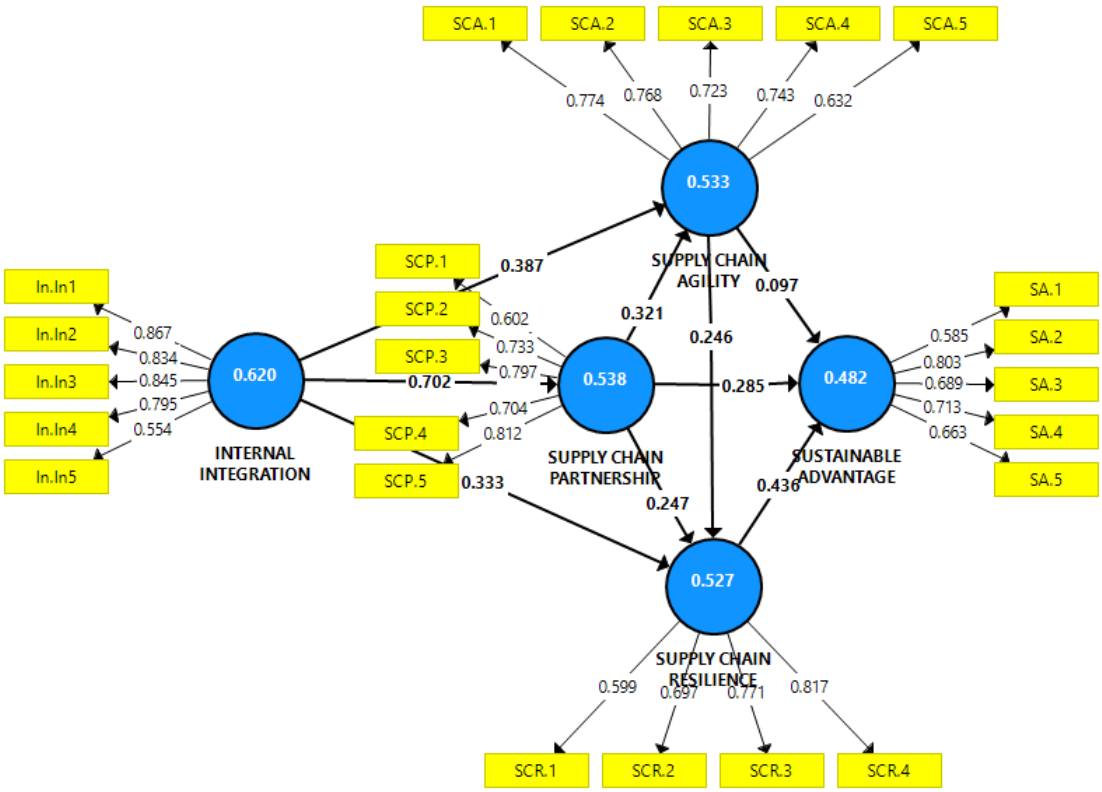

Figure 2. Path analysis of the research model.

4.2. Discussion

The first hypothesis (H1), internal integration impacts SC partnerships in the manufacturing companies, is supported. Internal integration, which is implemented by data integration between departments, and data changes are communicated quickly to other functions, can improve SC partnerships. The marketing department could coordinates directly with the production department concerning the incoming customer orders. The company's purchasing department coordinates actively with suppliers when there is a change in orders from customers. This study supports previous research results stating that internal integration impacts SC partnerships in companies [14,16,17,35,42].

The second hypothesis (H2) states that internal integration impacts SC agility in manufacturing companies. Companies carry out internal integration to coordinate promptly between functions in charge, and data integration during the pandemic affects SC agility to respond to changes. Manufacturing companies can make changes to production planning quickly to adjust to conditions during a pandemic and simultaneously make the production process change rapidly according to a customer's needs. Manufacturing companies in Indonesia continue to run normally, but some companies keep working distance by replacing two shifts previously with only one shift to maintain production capacity. This research is in line with research that states that internal integration impacts SC agility in manufacturing companies [13,19–21,43].

The third hypothesis (H3), internal integration impacts SC resilience in manufacturing companies, is also supported. Internal integration shows that all departments can access company data in real time and coordinate quickly in interdepartmental changes affecting SC resilience. Manufacturing companies can still serve customer demands during a pandemic and adapt quickly during a pandemic to form SC resilience. The cross-functional ability to find information quickly can make the right decisions to adapt during a pandemic

quickly. Company employees can find out about the arrival and inventory of material stock, adjusted to the number of orders ordered, and decisions are made directly to the company's operations to fulfill customer orders. This study supports the research results that state that internal integration impacts SC resilience in companies [17,18,31,33–35,40,41].

Furthermore, the fourth hypothesis (H4) that SC partnership affects SC agility in manufacturing companies is accepted. The SC partnership built allows suppliers to understand changes in orders during a pandemic to adjust the production process to change quickly according to needs during a pandemic as a form of SC agility. Moreover, SC partnerships allow delivery of materials from suppliers on time, impacting the production process normally during a pandemic to fulfill predefined orders. The purchasing function, marketing function, and production function are coordinated every morning through online meetings. The resulting coordination can anticipate changes in the production process and can provide good service to customer needs. The results of this study support the results of research that state that SC partnerships have an impact on SC agility in companies [19–21,23,24,28,43].

As expected, the fifth hypothesis (H5) is also supported. SC partnerships impact SC resilience in manufacturing companies. SC partnership is in the form of a supplier understanding of order changes which allows the companies to maintain its buffer stock to keep products that customers may need are available during the pandemic. Partnerships that can collaborate with suppliers during a pandemic will increase SC resilience because they can serve customer demands during a pandemic normally. This study supports the research results that SC partnerships impact SC resilience in manufacturing companies [18,31,36,37].

The sixth hypothesis (H6) can be accepted, and it is stated that SC agility has an impact on SC resilience in manufacturing companies. The company keeps the production process running normally during the pandemic to fulfill orders as a form of SC agility, so it is necessary to maintain a buffer stock during the pandemic period in order to be able to maintain SC resilience. The company maintains the production process by changing it into two shifts so that the work system is adjusted quickly according to government regulations to determine the occurrence of SC resilience for customers by maintaining production capacity during a pandemic. The company's SC agility can increase SC resilience [12,30,31,40].

The seventh hypothesis (H7), SC partnerships have an impact on sustainable advantage in manufacturing companies, is also supported. A solid SC partnership allows suppliers to deliver material on time so that the company's production process runs according to a predetermined schedule and directly impacts product delivery on time during a pandemic period to increase the sustainable advantage. The company always coordinates every morning in carrying out production planning by taking into account the availability of raw materials. Additionally, SC partnerships that involve collaborating suppliers to help companies during a pandemic impact product quality that can be maintained during a pandemic period. SC partnerships impact manufacturing companies' sustainable advantage [18,37,44].

The eighth hypothesis (H8) can be accepted, and it is stated that SC agility has an impact on sustainable advantage in manufacturing companies. According to pandemic conditions, the company's SC agility by adjusting the resulting production capacity is associated with reliable sales volume, compared to competitors in pandemic conditions due to the company's sustainable advantage. Besides that, the company's agility in determining production planning regarding rapid changes in adjusting to the situation during a pandemic is related to the timely delivery of products during the pandemic to achieve sustainable advantage. This study supports previous researchers who stated that SC agility impacts sustainable advantage in companies [5,11,13,27,30,38,43].

The ninth hypothesis (H9) is accepted that SC resilience impacts sustainable advantage in manufacturing companies. The company's ability to maintain buffer stock during a pandemic period makes SC resilience reliable, thus determining a sustainable advantage in delivering products on time during a pandemic and reliable sales volume, compared to

competitors in pandemic conditions. Many manufacturing companies experience difficulty in raw materials in the pandemic era, especially companies that are essential to preventing the spread of COVID. For companies with a high buffer stock, the disruption conditions are an advantage in meeting customer demands. Resilience during a pandemic condition for manufacturing companies still serves customer requests during the pandemic period because there is no lockdown, but the company runs a Health protocol while employees are working. Work activities carried out routinely maintain production capacity so that company profits can be relied on during a pandemic to increase the sustainable advantage. This research supports previous research that states that SC resilience impacts sustainable advantage in companies [17,18,38,40,44].

Manufacturing companies are always trying to make integrated information systems an important tool during a pandemic because the interaction between cross-functional parties can be reduced but still reliable for the company's internal and external coordination. Information systems are used for internal and external integration or SC integration, which relies on SC partnerships. The company's ability to involve external and cross-functional parties on the internal side increases SC agility and SC resilience. SC partnership, SC agility, and SC resilience impact increasing sustainable advantage during the COVID period to become a theoretical contribution to research. The practical contribution of research impacts top management to continue to empower all company internal and external functions. The company adjusted the work system by making two production shifts to carry out government regulations related to preventing the spread of the virus as a form of resilience organization, but still producing products according to customers' orders quickly within the built agility.

Other essential findings of this study are the revelation of the mediating role of the intervening variables, namely, supply chain partnership, supply chain resilience, and supply chain agility. As shown in the research model, the second research question examines whether the SC partnership, SC resilience, and SC agility mediate the relationship of internal integration on the sustainable advantage. The mediating role of the three variables was examined by looking at the two direct relationships consecutively. It has been noticed that internal integration directly affects the SC partnership (H1) and SC partnership directly affects sustainable advantage (H7). It implies that internal integration indirectly affects sustainable advantage through the mediating role of SC partnership. In other words, SC partnership does mediate the influence of internal integration on sustainable advantage. Similarly, internal integration influences SC agility (H2), and SC agility affects sustainable advantage (H8), implying that internal integration indirectly improves sustainable advantage through SC agility. Furthermore, since internal integration directly affects SC resilience (H3), and SC resilience directly influences sustainable advantage (H9), it can be concluded that internal integration indirectly affects sustainable advantage through SC resilience. As expected, the results indicate that those three intervening variables do mediate the relationship. This finding implies that internal integration has multiple effects on the sustainable advantage when a company implements supply chain partnership, supply chain resilience, and supply chain agility. These findings have highlighted the importance of internal integration to improve the sustainable advantage of a company. Moreover, the organization also needs to integrate with its external partners enabling quick coordination to pursue any customer demand changes. The integration with external partners allows the company to establish supply chain partnerships, develop supply chain agility, and supply chain resilience to pursue improved sustainable advantage. The collaboration with an external partner such as supplier and distributors, called supply chain partnership, enables the company and partner to forecast, plan, and adjust the production to any customer demand variation. SC partnerships allow suppliers to understand changes in orders during a pandemic, adjust the production process to change quickly, and increase their buffer stock and adjust to customer needs. Furthermore, the supply chain agility enables the company and its partners to cope with any sudden changes in demand volume, product varieties, and delivery schedule requested by the customer. At the same time, the supply chain

resilience allows the company and its partners to meet its promise to the customer even though any constraints due to disruption in supply, transportation, and logistic network. Finally, when the company implements internal integration and establishes supply chain partnerships, it enhances supply chain agility, and supply chain resilience will increase the sustainable advantage, enabling the company to meet any change in customer demand at any time.

5. Conclusions

The initial purpose of this study is to examine the impact of internal integration, supply chain partnership, supply chain agility, and supply chain resilience on sustainable advantage. As expected, the results indicate that data support all nine hypotheses developed, and all findings are in line with previous research referenced in this study. Internal integration influences SC partnerships (H1), internal integration affects SC agility (H2), internal integration affects SC resilience (H3), SC partnership influence SC agility (H4), and SC partnership improves SC resilience (H5). Furthermore, SC agility improves SC resilience (H6), SC partnerships affect sustainable advantage (H7), SC agility influences sustainable advantage (H8), and SC resilience affects sustainable advantage (H9). The interesting findings of this study are the existence of the mediating role of the three intervening variables—supply chain partnership, supply chain resilience, and supply chain agility. Internal integration indirectly influences the sustainable advantage through the mediation of SC partnership, SC agility, and SC resilience. In summary, the implementation of internal integration within an organization and the collaboration with the external party in establishing supply chain partnerships, supply chain agility, and supply chain resilience enable the manufacturing company to enhance its sustainable advantage. This result implies that internal integration provides multiple effects in improving the sustainable advantage. These findings have highlighted the importance of internal integration to improve the sustainable advantage of a company.

As discussed previously, this research provides a practical contribution on how the manufacturing companies could recover from the current disruption era due to the COVID-19 pandemic. The company needs to establish an excellent internal integration, enhance supply chain partnerships, supply chain resilience, and supply chain agility to pursue an improved sustainable advantage. This study could also enrich and extend the acceptance of the current research in the context of the manufacturing industry.

This work has some limitations, particularly in terms of the population and the variable involved. Further studies on the current topic are suggested to involve the variables such as supply chain risk management and customer relationship management to cover more stakeholders and functions involved in the supply chain network.

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