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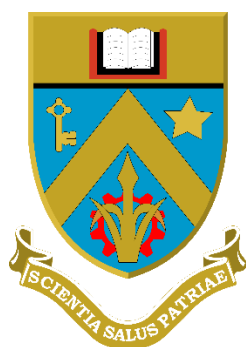
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Table of Contents

Paper	Page #
<i>Language Preferences, Use and Beliefs of Arab Gulf English Majors</i> C. J. Denman and Chandrika Balasubramanian	1-2
<i>Integrating the Sustainable Development Goals (SDGs) in a University English Course for Macau Students: Fostering Global Citizenship and Sustainable Academic Research</i> Kerrin Burnell	3
<i>Decent Work and Economic Growth as Key Drivers to Achieve Universal Social Protection for Migrant Workers in SADC</i> Lovemore Mabiza	4
<i>Sustainable Development Goals in Spatial Planning: the SADC as an Urban System</i> Mariske van Aswegen and J. Ernst Drewes	5-6
<i>Developing ABC-VED with Multi-Criteria Analysis for Drug Inventory Management: Ayder Referral Hospital</i> Assefa Beyene Ayalew, Aschale Getnet Alemu and Alebachew Mengistu Worku	7
<i>Optimization of Corporate Insolvency Legal Frameworks for Sustainable Development Principles: A Systematic Review of Qualitative Evidence from Tanzania and Mauritius</i> Yusto Lucian Habibe, Rajendra Prasad Gunpath and Sameerchand Pudaruth	8-9
<i>Enhancing Academic Achievement of Learners with Attention Deficit Hyperactivity Disorder (ADHD) Symptoms Through Teacher-Learner Proximity in Government Primary Schools in Wakiso District, Uganda</i> Josephine Ssirimuzaawo, Frank Pio Kiyingi, Juliet Wamala and Musoke Miph	10
<i>Indigenous Resilience: Maasai Coping Mechanisms amidst Climate Change in Kilosa District, Tanzania</i> Venance Shillingi and Eliza Mwakasangula	11
<i>Toward Global Equity in Health Professions Education Publishing: Systematic Review</i> Sumera Keenoo	12
<i>Implementation of Reflective Portfolios in Clinical Clerkships: A Strategy to Boost Medical Student Learning</i> Sumera Keenoo	13
<i>Fostering Health Equity and Social Justice in Medical Education: Intersections with Professionalism and Ethical Practice</i> Sumera Keenoo and Tina Sookna	14
<i>Towards a Human Rights-Based Approach to Implementing Ghana's Free Senior High School Policy</i> Ama Fowa Hammond and Jennifer Hall	15

<i>Development Planning and the Sustainable Development Goals: Perspectives from Ghana</i> Richard Adjei Kyeremateng	16
<i>Harmonising International Investment Agreements with Sustainable Development Goals in Africa</i> Ama Fowa Hammond and Dorcas Elikplim Ameonu	17
<i>The Analysis of the Dependent Security Culture in the Congo Region</i> Weidong Zhu and Ziheng Luo	18
<i>Climate Change and Sustainable Development in Ghana: An Analysis of the Legal Framework for Renewable Energy Transition</i> Martin Waana-Ang	19
<i>Examining What the Goals of a Legal Framework Would be for Workers within the Platform Economy: Building Solutions to Achieve Sustainable Development Goals</i> Adedamola Adeniran, Rajendra Parsad Gunpath, Sameerchand Pudaruth and Indra Dusoye	20
<i>Establishing Legal Frameworks for China-Africa Cooperation Under the Belt and Road Initiative</i> Weidong Zhu	21-33
<i>Distance Learning in Times of Crisis and the Changes towards Digitalization</i> Simona Grigaliūnienė, Jurgita Martinkienė and Rajendra Parsad Gunpath	34-39
<i>Packaging Properties for the Food Industry Towards the Sustainable Packaging</i> Simona Grigaliūnienė, Modestas Jankūnas and Jolanta Janutėnienė	40-50
<i>Fintech in the COVID-19 Epoch: The Adoption and Future of Contactless Payment Technology of a Cashless Society</i> Bhavish Jugurnath, Navima Jhurry and Rajendra Parsad Gunpath	51-61
<i>Sustainability of the Banking System: Changes for Business</i> Angelė Lileikienė and Simona Grigaliūnienė	62-68

Professor (Dr. Dr.) Rajendra Parsad Gunputh
Personal Chair in International Comparative Study
University of Mauritius
rpgunput@uom.ac.mu



After School Certificate (Grade 1 with Distinction in Chemistry), and Advanced Level with 4 Principal Pass at one sitting from University of Cambridge with Distinction in French, he studied law. He holds a double PhD (Law) from the l'Université Paris V-René Descartes (France) in Public Law and l'Université de la Réunion in Private Law both with the highest distinctions (First Class). He holds a HDR from l'Université de la Réunion, a PGCE in Higher Education from the University of Mauritius and a Post-Doctorate from l'Université Paris X-Nanterre (France) in Public Law. He was Head of the Law

Department (2008-2014) and Dean of Faculty of Law and Management (2020-2023). He innovated with undergraduates and postgraduates' programmes bringing funds to the university (BSc Police Studies, BSc Criminal Justice, LL.M International Business Law, LL.M Human Rights, LPVC, etc).

He is a member of several Editorial Boards and Scientific Committees of a very number of journals (35) and has assisted as an international peer reviewer (200) and assessor for PhD students (16). He is a novelist, poet and writer (3), wrote treaties on Mauritian Law (2), and manuals on Law (27) and SDGs (2). He is also a member of committees on Human Rights, International Humanitarian Law and various other committees. He has supervised 7 PhD students to completion. He has 14 ongoing MPhil/PhD students. He had Erasmus Scholarships (2), and several awards and accolades for his work and achievements. He had also assisted students to attend Moots Competition in various universities abroad (India, La Réunion, South Africa, Comoros Islands, Madagascar) and participated as member of the Jury.

He has contributed to abstracts (200), scholarly journals (180), is a member of the UoM SDGs newsletter, has assisted ministries in various legal issues (10), was a legal expert for HEC/TEC, was appointed chairperson on several committees (33), was chief editor of journals and a large number of Certificate of Appreciation as a reviewer (55), has published books and manuals (19), various chapters in books (36) and with many keynote addresses (21) in various conferences worldwide (Dubai, India, Indonesia, Thailand, Malaysia, Sumatra and Borneo, Seychelles, Singapore, South Africa, Kenya, Mozambique, Zambia) with the Best Award Paper on Surrogacy (Beppu, Japan, 2014).

He is an Honorary Professor at the University of Xiangtan, China (Centre for African Laws and Society) and Visiting Professor at the Gujarat National Law University.

Keynote Speakers



Professor (Dr. Dr.) Stephanie ROHLFING-DIJOUX holds a PhD in German Law and PhD in French Private Law. She is a full **Professor** at the **Université Paris Nanterre** since 2008. She is in charge of the German Law Curriculum between the Universities of Paris Nanterre and Potsdam. She is also a guest professor at the University of Mauritius and the GNLU, India.

Title of Talk: Tourism in the future: how can the needs of travellers, the local population and nature live together without harming one another?



Dr Indranarain RAMLALL is presently **Associate Professor** in the field of Finance and Economics at the **University of Mauritius**. Prior to joining the University, he was a Banker, Fund Manager and Central Banker. His research interests include banking, risk management, financial stability, central banking, asset pricing, DSGE macroeconomic modeling, climate risk analysis, investment analysis, technical analysis, fundamental analysis, CGE modeling, quantitative techniques, econometric modeling and Green Finance. His publications appear among Palgrave Macmillan, Emerald Group Publishing, Elsevier

(including A-rated journals), Wiley-Blackwell, Taylor and Francis, SAGE and World Scientific. He is the founder of Central Bank Ratings, published in two editions by Palgrave Macmillan. **Title of Talk: Climate Risk Analysis**

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Language Preferences, Use and Beliefs of Arab Gulf English Majors

C. J. Denman

Office of the Deputy Vice-Chancellor for Postgraduate Studies & Research and Humanities
Research Centre, Sultan Qaboos University
Muscat, Sultanate of Oman

Chandrika Balasubramanian

Department of English Language and Literature,
College of Arts and Social Sciences, Sultan Qaboos University
Muscat, Sultanate of Oman

Abstract

The Sultanate of Oman has a highly complex linguistic landscape in which Arabic and English act as the primary gatekeepers of social, academic, and professional success. While Arabic is the official language, dominating interactions with government entities, public school education, and familial communication, English is the primary language of higher education, the private sector, health care, tourism and recreation and so on. Due to English's centrality to national sustainable development efforts, Oman's university students often pursue their studies in programs where it is the medium of instruction. Although a large body of research from the region has examined the attitudes of learners in English medium programs to the role the language plays in their academic, personal, and future professional lives, only a limited amount is explicitly concerned with language preferences and use across domains. Further, a relatively understudied sub-group of Arab Gulf university students has been those majoring in English Language and Literature, even though these learners may offer a fascinating glimpse of a group of young people whose current studies and future careers are intricately-tied with English and its associated cultures.

The research reported in this paper begins to fill this gap by examining Omani English majors' preferences for, and actual use of, English and Arabic across academic, professional, personal, and social domains, in addition to beliefs about the current and future importance of the two languages. It did this by administering a four-section 37-item questionnaire to, and conducting semi-structured interviews with, 120 and 13 English majors at Oman's national university, respectively. The questionnaire collected categorical data including through response options of English, Arabic, Both English & Arabic, and Other Language for items about participants' language use and preferences. The semi-structured interviews employed guiding questions about the themes of language preference, use, and beliefs as informed by both the literature and emerging questionnaire results. Descriptive analysis, with a focus on frequency counts, was used for quantitative questionnaire data while qualitative interview data was analysed thematically following transcription.

Results indicate that English generally dominates respondents' language use and preferences for academic and future professional purposes, and Arabic for interacting with family members. Interestingly, around one-third of participants stated they would like to study their majors in Arabic rather than English. Finally, and somewhat unexpectedly, the majority of participants offered a preference for English and Arabic or English by itself to talk about feelings and beliefs, even though these are often characterised in the literature as Arabic-dominated domains. Findings have a number of potential consequences for language policies in the Arab Gulf and similar education contexts around the world. These include in terms of the possible necessity of revisiting national tertiary education policies that give English pride of place in second/foreign language contexts, and of

ensuring learners' identities and content understanding are not negatively impacted by studying in a non-native tongue. Implications for the effectiveness of education in sustainable development initiatives in Oman and beyond are discussed.

Keywords: English and Arabic, language preferences, language use, learner identity, English majors, education and development.

Integrating the Sustainable Development Goals (SDGs) in a University English Course for Macau Students: Fostering Global Citizenship and Sustainable Academic Research

Kerrin Burnell
University of Macao
Macao

Abstract

This report explores the integration of the Sustainable Development Goals (SDGs) within an English Writing for Academic Research course offered to upper-intermediate level students in Macau. The course aims to develop information literacy, critical thinking, and argumentation skills necessary for conducting extensive secondary research and producing coherent academic texts. Prior studies have shown that integrating the SDGs into university coursework can enhance students' awareness of global issues and their ability to research topics related to sustainability and equity (Pallant et al., 2020). However, research also indicates that only 28% of people are even familiar with the SDGs (Yuan et al., 2022), highlighting the need for greater awareness. This report will use excerpts from student work to demonstrate the positive outcomes that resulted from using the SDGs as a framework to structure a writing course curriculum. By aligning the course content and assignments with the SDGs, the aim is to equip students with the research and writing skills necessary for exploring complex global challenges. The key focus is on how the SDGs were leveraged to enhance the development of critical information literacy, analytical thinking, and persuasive academic writing abilities among the student participants.

Keywords: Sustainable Development Goals (SDGs), English for Academic Purposes (EAP), Global Skills Development

Decent Work and Economic Growth as Key Drivers to Achieve Universal Social Protection for Migrant Workers in SADC

Lovemore Mabiza
University of Johannesburg
South Africa

Abstract

International labour migration is a global challenge that has seen workers migrate to escape unemployment, poverty and other social, economic, and political pressures in their home countries. Like the rest of the world, one of the common challenges that migrant workers in the Southern African Development Community (SADC) face is that they do not have adequate labour and social protection in their country of work. Yet, international and regional treaties support the protection of labour and social security rights of all workers in their countries of work regardless of their nationality or immigration status. Moreover, the United Nations Agenda 2030 for Sustainable Development Goals (SDGs), seek to achieve global peace and prosperity and, through its goals and targets, calls for all countries to work together to find solutions for global challenges. Through these goals and targets, the UN envisages a world with universal access to social protection, among other things. Thus, these international standards may provide principles and guidelines to address global challenges. Hence, the solutions to challenges that arise from shared responsibilities and interdependence require a collective response. Focusing on social protection for migrant workers in SADC, SDG 8 aims to promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work. Considering the preceding, it seems that the goals and targets under Agenda 2030 have the potential to influence the SADC community to implement collective measures that will improve labour and social protection for migrant workers. Thus, this study will examine the role of international standards in light of SDG 8 in addressing the social protection needs of migrant workers in SADC. The objective of this article is to stress that the coercion through international and regional goal-setting may provide a conclusive, regional response to the continuing development of social protection for migrant workers in the SADC region. It does so by first critically evaluating the aims of SDG 8 and its impact on achieving universal social protection. Secondly, this study will examine the role of the International Labour Organisation (ILO), and its “decent work agenda” in addressing challenges facing migrant workers in SADC. Thirdly, this study will also discuss regional standards in relation to the labour rights and social protection for migrant workers in SADC. This study will follow a doctrinal research methodology in critically analysing the contemporary legal and policy framework in respect of the regulation of social protection for migrant workers in SADC. The study will draw on various sources, including case law, legislation, international instruments, academic articles, and textbooks. The available literature on SADC’s ability to meaningfully extend adequate social protection to migrant workers is fragmented. There also seems to be scant literature that considers the impact of the SDGs. Hence, this study seeks to fill this gap by addressing the impact of SDGs in advancing social protection for vulnerable workers in SADC.

Keywords: sustainable development goals, labour, migration, social security, social protection, migrant workers, informal economy, international and regional framework.

Sustainable Development Goals in Spatial Planning: the SADC as an Urban System

Mariske van Aswegen
North-West University
Potchefstroom, South Africa

J. Ernst Drewes
North-West University
Potchefstroom, South Africa

Abstract

Cities are recognised as pivotal in societal evolution and development (Frey & Zimmer, 2001), with the 2030 Agenda for Sustainable Development highlighting their role as catalysts for sustainable development in the 11th Sustainable Development Goal (SDG) focusing on "sustainable cities and communities" (UN, 2015). Developing nations, formerly referred to as Third World Countries or the "periphery" (Dados & Connell, 2012), are now more commonly referred to as the Global South. These countries face numerous challenges, including rapidly growing populations, competing demands with the Global North (developed counterparts), disconnection from key infrastructure, unstable politics, lingering effects of economic marginalization, urban fragmentation, extreme poverty, and associated socio-economic impacts (Koonings & Kruijt, 2007; Watson, 2013). These characteristics further complicate the challenges associated with sustainable development across the urban system within the Global South.

The Global South, particularly the SADC, has lagged in sustainable development efforts compared to other regions, prompting special attention to international policy approaches (UN, 2009; UN, 2021). Given that more than half of global population growth between 2019 and 2050 is expected to occur in sub-Saharan Africa (UN, 2019), there is an urgent need for sustainable spatial planning in urban areas and across spatial scales. Current research on urban sustainability is primarily focused on individual cities or regions, revealing a gap in understanding the complexities and sustainability of the urban systems (across spatial scales) perspective (ACERE, 2018). The way cities respond to development pressures is crucial for their long-term sustainability and short-term efficiency. The type and intensity of these pressures differentiate urban areas in the Global South from those in the Global North (Du Toit et al., 2018). Typically, countries in the Global South are not able to focus on the "soft" issues of environmental sustainability or societal development (SDGs 5, 7, 10, and 12–17), as they are overwhelmed by daily struggles related to basic needs, employment, and service delivery (SDGs 1–4, 6, and 8 & 9) (Drewes & Van Aswegen, 2013). Consequently, the social and environmental aspects of sustainability strategies are often overlooked (Ghosh et al., 2019). Godschalk (2004) rightly states that planning for sustainable development is dependent on resolving the conflict between sustainable (future focus) and liveable (present focus) to create a more sustainable city.

To assess the traditional compliance of Global South countries with the SDGs, five case studies are provided, i.e. South Africa, Namibia, the United Republic of Tanzania, Mauritius, and the Democratic Republic of Congo. These five countries are part of the SADC economic bloc, and their performance regarding the SDGs will be assessed, and compared using secondary data analysis utilising the Sustainable Development Report (2021) with a focus on SDG11.

The research argues that sustainability challenges in the Global South, particularly within the SADC, differ significantly from those in the Global North and should not be evaluated using the same criteria. The paper establishes that SADC countries should aim to prioritise short and medium-term economic growth and infrastructure development within the spatial planning policy and frameworks, with an immediate focus on a liveable environment.

Keywords: Sustainable urban development, SADC; Global South, spatial planning, urban system.

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Developing ABC-VED with Multi-Criteria Analysis for Drug Inventory Management: Ayder Referral Hospital

Assefa Beyene Ayalew, Aschale Getnet Alemu and Alebachew Mengistu Worku
Bahir Dar Institute of Technology,
Bahir Dar University, Bahir Dar, Ethiopia

Abstract

Inventory management is a scientific approach employed in various manufacturing and service sectors to regulate the movement of goods. In the pharmaceutical industry, inventory management plays a crucial role in preventing shortages or excessive amounts of drugs. The persistent inventory management issue at Ayder Referral Hospital presents an opportunity for research. This study aims to develop a drug inventory control system specifically for the pharmaceutical department at Ayder Referral Hospital, utilizing both qualitative and quantitative data collection methods. Microsoft Excel is used as a potent instrument in the implementation of the Vital Essential Desirable (VED) and Activity Based Costing (ABC) methodologies with lead time. Forecasting techniques and the Economic Order Quantity (EOQ) model are also utilized. Ultimately, the total inventory cost is reduced from 207,600.4091 to 170,998.246 Birr, indicating a significant improvement of 17.63% that can be implemented in practical settings. The combination of ABC-VED techniques with lead time proves to be valuable for Ayder Referral Hospital and similar service industries.

Keywords: ABC-VED, drug inventory, EOQ, forecasting, lead time.

Optimization of Corporate Insolvency Legal Frameworks for Sustainable Development Principles: A Systematic Review of Qualitative Evidence from Tanzania and Mauritius

Yusto Lucian Habibe¹²

¹University of Dar es Salaam

Dar es Salaam, Tanzania

²University of Mauritius

Moka, Mauritius

Rajendra Prasad Gunpath and Sameerchand Pudaruth

University of Mauritius

Reduit, Mauritius

Abstract

Sustainable development aims to meet the needs of the present without compromising the ability of future generations to meet their own needs. This involves a balance of economic growth, social inclusion, and environmental protection, encapsulated in the 17 Sustainable Development Goals (SDGs) (United Nations, 2015). This study examines the role of insolvency legal frameworks in supporting sustainable development, focusing on the balance between economic growth and social responsibility (Harjono et al., 2023). It evaluates current insolvency structures in Tanzania and Mauritius, identifies inefficiencies, proposes reforms, and assesses optimization mechanisms for sustainable economic development. Insolvency frameworks as structured systems of laws and regulations designed to address financial distress in businesses, aim to protect creditors' and debtors' rights, maximize asset value, and facilitate orderly liquidation or reorganization (World Bank, 2021). Fulbright (2021) highlights the importance of a balanced insolvency regime that considers both debtors' and creditors' interests. Effective insolvency regimes contribute to sustainable development by rescuing viable companies, safeguarding employment, optimizing resource allocation, and enhancing creditor recoveries (Gurrea-Martinez, 2020).

Key questions the study will address include, the challenges of current insolvency frameworks, their alignment with sustainable development principles of Inclusive Development and Integrated Decision-Making (United Nations, 2015), and necessary reforms. The study focuses on the economic ties between Tanzania and Mauritius, which have been strengthened through agreements like the General Framework Agreement (GFA) and the Bilateral Investment Treaty (BIT), emphasizing the need for effective insolvency frameworks to support sustainable business operations and economic stability (Government Information Service, 2022). In Mauritius, the Insolvency Act of 2009 forms the basis of the insolvency framework, while Tanzania relies on the Companies Act of 2002 and the Companies (Insolvency) Rules of 2002. However, these frameworks face challenges such as lengthy court processes and uncertainties in claim rankings. (Namdarkhan, Mungur, & Beebejaun, 2022; Tanzania Law Reform Commission, 2019).

The methodology is qualitative, involving a comprehensive literature review and primary data collection through surveys. At least 20 respondents from diverse backgrounds will provide insights via tailored questions. Data will be analyzed using relational qualitative content analysis, with codes refined into descriptive categories and themes. Peer review by legal scholars will be invoked to ensure

the accuracy and reliability of the findings. This study will provide critical understandings into the optimization of corporate insolvency legal frameworks in Tanzania and Mauritius, aligning them with sustainable development principles to create a balanced regime supporting economic growth and social responsibility. The findings will contribute to the broader discourse on sustainable economic development and serve as a blueprint for other nations aiming to harmonize their insolvency laws with sustainable development goals, fostering resilient and inclusive economies.

Keywords: Asset value maximization, creditors' rights, economic growth, insolvency legal frameworks, Mauritius, Tanzania.

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Enhancing Academic Achievement of Learners with Attention Deficit Hyperactivity Disorder (ADHD) Symptoms Through Teacher-Learner Proximity in Government Primary Schools in Wakiso District, Uganda

Josephine Ssirimuzaawo

Nkumba University
Entebbe, Uganda

Frank Pio Kiyingi

Nkumba University
Entebbe, Uganda

Juliet Wamala

Kyambogo University
Kampala, Uganda

Musoke Miph

Nkumba University
Entebbe, Uganda

Abstract

This study investigated the impact of Teacher-Learner Proximity (TLP) on enhancing the academic achievement of learners exhibiting symptoms of attention deficit hyperactivity disorder (ADHD) in government primary schools in Wakiso District, Uganda. Utilizing a randomized controlled trial (RCT) design, the research encompasses two groups: an experimental group, which experienced the TLP intervention, and a control group implementing traditional teaching methods. Data were collected using standardized assessments, observation checklists and teacher evaluations, with 104 learners evenly split between the two groups. The TLP intervention, focused on increasing the proximity between teachers and learners. The findings reveal a significant improvement in the academic performance of learners with ADHD symptoms in numeracy, reading and writing, as demonstrated by a p-value of .000, indicating the effectiveness of TLP interventions. Specific improvements included numeracy scores rising from 21.5 to 53.42, reading from 30.25 to 59.17 and writing from 26.25 to 72.42, all showing high statistical significance. Correlation and regression analyses revealed a strong correlation (0.898) between TLP and academic performance, indicating that closer teacher interaction significantly aids learner outcomes. The findings suggest that TLP can be an effective intervention strategy to enhance the academic progress of learners exhibiting ADHD symptoms. This study contributes to the pursuit of goal number 4 of the Sustainable Development Goals by promoting education for all learners, regardless of their abilities. This further emphasizes the critical need for teacher training and systemic changes within the educational framework to support students /learners with ADHD more effectively.

Keywords: Teacher-Learner Proximity, Academic Achievement, ADHD Symptoms.

Indigenous Resilience: Maasai Coping Mechanisms amidst Climate Change in Kilosa District, Tanzania

Venance Shillingi and Eliza Mwakasangula
Mzumbe University, Tanzania

Abstract

The Maasai communities residing in the Kilosa District of Tanzania confront various obstacles resulting from climate change, jeopardizing their customary pastoral way of life. This investigation seeks to analyze the resilience strategies that the Maasai have developed in response to the increasing repercussions of climate change. The study utilized a qualitative methodology, integrating fieldwork techniques to assess the ways in which indigenous knowledge systems are leveraged by the Maasai to alleviate the impacts of climate change and protect their socio-ecological well-being. The study adopted a qualitative approach, using purposive sampling, in which essential informants were chosen, including leaders within the Maasai community, elders, and households that have developed various livelihood strategies. Semi-structured interviews coupled with focus group discussions were conducted with selected respondents to gather in-depth information about their adaptation practices. Furthermore, participant observation and field visits enhanced the depth of data, allowing a firsthand understanding of coping strategies adopted by the community. The saturation strategy led to the sample size was 40 respondents, drawn from different age sets, gender, and socio-economic categories in the Maasai community to enhance diversities of opinions on resilience strategies.

Data were analyzed using thematic analysis, identifying critical themes on livestock management, land use, water conservation, environmental stewardship, and sociocultural resilience. Findings indicate that the deep understanding of the environment and its connections by the Maasai is core in their resilience in the face of shifting weather patterns and increased climatic extremes. These adaptive strategies, grounded in traditional knowledge systems, involve a reduction in livestock numbers, changing to improved cattle breeds with increased tolerance to drought and diseases, livelihood diversification through agriculture, horticulture, employment, beekeeping, and small-scale enterprise. These activities add to the household's food security and challenge the many narratives of dependency on cattle for livelihood among the Maasai. The study further established that social cohesion and cultural resilience are the bases of Maasai adaptation strategies; hence, traditional institutions, age-set systems, and communal grazing agreements play a vital role in conflict resolution and resource allocation. Notwithstanding these adaptive strategies, structural inequalities in land use priorities, limited market access, and essential services are formidable barriers to their resilience processes. The current research underlines the protection of indigenous knowledge and empowers inclusive governance frameworks that allow local communities to co-design adaptation interventions relevant to specific contexts. By harnessing their cultural heritage in concert with external stakeholders, Maasai communities can navigate the intricacies of climate change while preserving their way of life for future generations. This research contributes to the growing body of knowledge on community-based adaptation and highlights an avenue through which indigenous practices can strengthen broader climate resilience strategies.

Keywords: Maasai, resilience, indigenous knowledge, diversification, Tanzania.

Toward Global Equity in Health Professions Education Publishing: Systematic Review

Sumera Keenoo
University of Mauritius
Réduit, Mauritius

Abstract

Background: Equity in health professions education, ensuring fair access to resources and opportunities, is crucial for global health. Open-access publishing enhances accessibility and equitable dissemination of educational resources worldwide.

Objectives: This systematic review evaluates the effectiveness of open-access publishing in promoting global equity in health professions education and identifies strategies for its optimisation.

Methods: Guided by the PRISMA framework, we systematically searched databases, including PubMed, Scopus, and Web of Science, for studies up to 2024 using terms like "open-access publishing" and "health education equity." We selected 45 peer-reviewed articles discussing open-access adoption, cultural and linguistic diversity, and capacity-building in underserved areas. The quality assessment used standardised checklists.

Results: Open-access publishing significantly increases the accessibility of educational materials, especially in low, and middle-income countries, showing a 50% increase in resource access. Key success factors included financial support from governments and agencies, educator collaborations, and recognition of cultural and linguistic diversity. Effective capacity-building initiatives, such as multilingual online courses, were crucial for local educators to produce and utilise open-access content.

Conclusion: Open-access publishing is vital for global equity in health professions education. Comprehensive strategies, including robust financial backing, cultural respect, and international collaboration, are essential. Efforts to mitigate potential limitations like publication bias, continued support for open-access initiatives, and capacity-building in underserved regions are crucial for equitable knowledge distribution and improving global health outcomes. Policymakers, educators, and international agencies should prioritise these strategies to enhance the education and outcomes of global health professionals.

Keywords: open-access, global equity, health professions education, capacity-building, cultural diversity.

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Implementation of Reflective Portfolios in Clinical Clerkships: A Strategy to Boost Medical Student Learning

Sumera Keenoo

University of Mauritius

Réduit, Mauritius

Abstract

Background: The intensive demands of clinical environments often lead to insufficient guidance for medical students, impacting their learning and development of decision-making skills (Koole et al., 2019). High student-to-patient ratios and limited clinical supervision diminish engagement (Dornan et al., 2019).

Aims and Objectives: A reflective portfolio was introduced to address these challenges, fostering skills development, self-directed learning, and professional growth through reflective practice and feedback (Schönrock-Adema et al., 2020).

Methodology: A reflective portfolio incorporating the mini clinical evaluation exercise (mini-CEX), direct observation of procedural skills, and reflective writing sections were implemented. Workshops emphasised reflective learning. The portfolio's impact was evaluated through undergraduate medical students' clinical clerkship surveys (Driessen et al., 2019).

Results: Feedback from 52 fifth-year medical students indicated that the portfolio highlighted strengths and areas for improvement, fostering professional growth (Janssen et al., 2020). The portfolio was labour-intensive, and timely feedback from supervisors was challenging. Over half adopted the Gibbs reflective model, with feedback preferences varying, indicating a need for consistent methods (Roberts et al., 2020). A quarter recommended a mobile app to enhance usability (Ahmed et al., 2021).

Conclusion: Reflective portfolios support self-directed learning and professional development in medical students. Future research in digitalising and standardising reflective practices and refining feedback mechanisms is promising (Gandomkar & Sandars, 2020).

Keywords: reflective portfolio, self-directed learning, clinical education, feedback mechanisms, professional development.

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Fostering Health Equity and Social Justice in Medical Education: Intersections with Professionalism and Ethical Practice

Sumera Keenoo

University of Mauritius
Réduit, Mauritius

Tina Sookna

University of Mauritius
Réduit, Mauritius

Abstract

This study, which investigates the role of medical education in cultivating a commitment to health equity and social justice among future healthcare professionals, has yielded significant findings. The research, which includes surveys, interviews, and curriculum analysis, examines how curricula, teaching strategies, and institutional policies shape students' understanding and dedication to these principles. The study involved a sample of 150 medical students and 20 faculty members selected to provide diverse perspectives on integrating health equity and social justice in medical education. It also explores the intersections between health equity, social justice, professionalism, and ethical practice, analysing how these concepts are integrated and reinforced throughout medical training. The findings indicate that comprehensive education on social determinants of health, inclusive teaching practices, and a strong emphasis on ethical reasoning significantly enhance students' commitment to equitable and just healthcare delivery. The relationship between social justice and medical care is foundational, as addressing health disparities requires a commitment to fairness and equality in healthcare access and outcomes. This alignment ensures that all patients receive the care they need regardless of socioeconomic status. The study concludes with recommendations for medical educators to strengthen these aspects within their programs, promoting a more socially conscious and ethically driven healthcare workforce.

Keywords: health equity, social justice, medical education, professionalism, ethical practice, social determinants of health

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Towards a Human Rights-Based Approach to Implementing Ghana's Free Senior High School Policy

Ama F. Hammond

University of Ghana School of Law
Accra, Ghana

Jennifer Hall

University of Ghana School of Law
Accra, Ghana

Abstract

The literature suggests that international institutions play a crucial role in fostering development through the application of a rights-based approach. Notably, United Nations entities such as UNICEF, UNESCO, WHO, and the World Bank have endeavored to integrate human rights into their development initiatives, aiming to address the concerns of human rights concerns of third-world countries within their developmental agendas. Many third-world countries have become disillusioned with the promises of international development, recognizing that increased aid, foreign direct investment, and trade liberalization do not necessarily equate to tangible development outcomes. Despite the considerable emphasis on the international dimensions of the rights-based approach to development, there is inadequate discourse on how countries can implement this approach in their domestic development policies. This article seeks to bridge this gap by evaluating, from a normative perspective, the potential of the rights-based approach to enhance the implementation of development projects at the national level. This article uses Ghana's Free Senior High School (SHS) Policy, which supports the UN Sustainable Development Goals (Goal 4 on inclusive and equitable quality education), as a case study to demonstrate how the absence of a rights-based approach to development can result in arbitrary, haphazard and unilateral decisions by the government regarding the education of students. This article finds that such an approach by the government disregards essential human rights principles, particularly participation, accountability, non-discrimination, equality, and legality, which are fundamental to the rights-based approach to development. Thus, it recommends the national adoption of the discourse of human rights, considering that it can enhance government accountability to its citizens while enhancing the free SHS policy and ensuring its sustainability.

Keywords: Ghana, rights-based approaches, free senior high school, sustainable development goals.

Development Planning and the Sustainable Development Goals: Perspectives from Ghana

Richard Adjei Kyeremateng
University of Ghana
Accra, Ghana

Abstract

The 2019 SDG Summit called on countries to “mainstream the 2030 Agenda into our national planning instruments, policies, strategies and financial frameworks”. Yet, the very national policies which these sustainable development goals are expected to be integrated into are highly unstable, particularly in less developed and developing countries. For instance, Ghana launched a 40 year development plan in 2015, before the 2016 elections. But by 2018, this plan had been suspended. In 2020, the NDPC launched a long-term national development plan dubbed “Ghana@100”, which spells out the development plan in key sectors and provides strategic interventions for the consolidation of the country’s democracy in the effort to achieve long-term milestones by 2057, when Ghana turns 100. Then in 2024, the NDPC launched a Long-term National Development Perspective Framework dubbed ‘Vision 2057: Long term National Development Perspective Framework’. This paper argues that this is detrimental for the ability of these countries to achieve any significant long-term progress in attaining the sustainable development goals. Using Ghana as a case study, this paper attempts an account of the causes of this instability, and examines the gaps in the conceptual framework on development planning as currently exists. Specifically, the paper reviews the legal framework governing the National Development Planning Commission of Ghana to determine the scope of its duties and functions and the extent to which the current regulatory framework effectively empowers the Commission to achieve its goals. This paper also examines the competing philosophies underpinning development planning as demonstrated in Ghana by the ‘action-based plans’ versus the ‘flexible- framework’ approach. To this end, the former approach as illustrated by Ghana’s 2015 40-year development plan is reviewed and compared to the latter as exemplified by the Vision 2057: Long term National Development Perspective Framework. After careful reflection and analysis, it is suggested that the element of continuity in the formulation and implementation of the development plans adopted by countries must be adhered to in order to achieve sustained progress towards the attainment of the sustainable development goals.

Keywords: sustainable development, development planning, United Nations, Ghana.

Harmonising International Investment Agreements with Sustainable Development Goals in Africa

Ama Fowa Hammond
University of Ghana
Accra, Ghana

Dorcas Elikplim Ameonu
University of Ghana
Accra, Ghana

Abstract

Currently, poorly facilitated investment agreements with porous tax regimes have been identified to lose the African continent billions of dollars in potential revenue. This is a huge impediment to the creation of robust economies and to the implementation of socio-economic development the continent urgently needs. Despite the numerous investment agreements entered by most African countries, a fundamental question has remained on whether these agreements have in truth reflected business sense and placed the people at the centre of negotiations to bring about sustainable development. The key objective of this paper is to review specific international investment agreements (IIAs) by selected five state-economies on the continent according to the indicators of political stability, sound economic policies, technological advancements; and human capital¹. For regional balance, these “big five” countries are Ghana, Nigeria, South Africa, Kenya and Democratic Republic of Congo. The terms of these IIAs shall drive the conversation on each state’s approach to aligning investment with sustainable development. This paper seeks to investigate whether African policies, strategies and innovations have truly leveraged on partnerships to meet the targets of the Sustainable Development Goals (SDGs). This paper recommends that although foreign direct investment will be crucial in achieving development outcomes, current IIAs in Africa need to be reformed and reimaged to achieve alignment with SDGs as well as Agenda 2063 of the African Union². The aim is to ensure that major IIAs are harmonised with SDGs, to achieve the objectives of sustainable development, including economic inclusiveness, and long-term prosperity for Africa.

Keywords: foreign direct investment, international investment agreements, Africa, investment legal frameworks, socio-economic rights, development, socio-economic justice, tax justice, Agenda 2063.

¹ Annie Spratt and Harshill Gudka, Africa’s Most Promising Investment Destinations, Investing in Africa Conference and Expo 2024.

² Johnson, Lise and Sachs, Lisa and Lobel, Nathan, Aligning International Investment Agreements with the Sustainable Development Goals (September 11, 2019). Columbia Journal of Transnational Law, vol. 58.
Available at: <http://dx.doi.org/10.2139/ssrn.3452070>

The Analysis of the Dependent Security Culture in the Congo Region

Weidong Zhu

Institute of West-Asian and African Studies, Chinese Academy of Social Sciences
Beijing, China

Ziheng Luo

University of Chinese Academy of Social Science
Beijing, China

Abstract

The dependent security culture is a national security perspective that utilizes external forces to solve security issues. It has long influenced Congo's security strategy preferences, leading them to believe that an outward oriented security strategy is the optimal way to solve security problems. After applying the theory of the three elements of cultural generation, especially combining the three elements of economic rule tools, military rule tools, religious philosophy, ritual ceremonies, and diplomatic language, a historical examination of Congo reveals that the development of a dependent security culture has gone through three periods, ultimately forming during the Kingdom of Congo and influencing its security strategic decision-making. After the dissolution of the Kingdom of Congo in 1668, the culture of dependent security continued. Regardless of changes in power structure and material factors, Congo retained its preference for outward oriented security strategies, and even the security strategy of the Zisekdi government exhibited the characteristics of a dependent security culture. Therefore, a comprehensive assessment of the impact of a dependent security culture on the security situation in Congo is of great value. From a positive perspective, a dependent security culture helps to promote security cooperation and avoid military competition; Negatively speaking, the characteristic of Congo seeking security assistance for a long time is easily exploited by Western countries with traditional security views, leading to great power games and regional mineral conflicts, resulting in long-term turmoil in Congo. Given the long-term impact of security culture, building a new type of security supply and demand relationship that fully respects the will of the Democratic Republic of Congo is the necessary strategy to achieve sustained peace in the Congo region. China, which holds advanced security concepts such as "mutual benefit and win-win" and "common security", can become the best partner in building this relationship with the Democratic Republic of Congo.

Keywords: safety culture theory, dependent safety culture, Congo regional security, China Congo security cooperation.

Climate Change and Sustainable Development in Ghana: An Analysis of the Legal Framework for Renewable Energy Transition

Martin Waana-Ang
School of Law
University of Ghana
Accra, Ghana

Abstract

This paper examines the legal framework governing the renewable energy transition in Ghana, with a particular focus on its effectiveness in addressing climate change and promoting sustainable development. Ghana, like many developing countries, faces significant challenges related to climate change, including rising temperatures, altered precipitation patterns, and an increased frequency of extreme weather events. In response, the Ghanaian government has implemented various policies and laws aimed at fostering a transition to renewable energy, such as the Renewable Energy Act 2011 (Act 832), the Energy Commission Act 1997 (Act 541), and the National Energy Policy. This study evaluates these frameworks against international standards and best practices, considering their strengths and weaknesses in driving renewable energy adoption and reducing greenhouse gas emissions. The analysis also explores other relevant legislations that may impact renewable energy and examines the role of governmental and non-governmental organizations in implementing these policies, alongside the socio-economic impacts of the renewable energy transition.

Findings indicate that while Ghana has made notable strides, including the establishment of a comprehensive legal framework and the successful implementation of several community-based renewable energy projects, challenges remain in enforcement, funding, and public awareness. For instance, the Energy Commission's capacity to enforce compliance with renewable energy regulations is hindered by limited resources. Additionally, despite progress, there is a need for updated legislative instruments and greater community engagement, as exemplified by the success of localized solar projects that have thrived through active community participation. The paper argues for the need to strengthen institutional capacities, enhance financial incentives, and foster broader community involvement to achieve a more effective renewable energy transition. This comprehensive evaluation underscores the critical interplay between legal frameworks, policy implementation, and sustainable development, providing insights into how Ghana can better align its renewable energy ambitions with climate resilience and economic growth objectives. Through this analysis, the paper contributes to the broader discourse on sustainable energy policy in developing contexts, offering recommendations for enhancing the legal mechanisms that support renewable energy development in Ghana.

Keywords: climate change, sustainable development, renewable energy, legal framework, Ghana, policy analysis, energy transition, environmental law.

Examining What the Goals of a Legal Framework Would be for Workers within the Platform Economy: Building Solutions to Achieve Sustainable Development Goals

Adedamola Adeniran
University of Mauritius, Mauritius

Rajendra Parsad Gunpath, Sameerchand Pudaruth and Indra Dusoye
University of Mauritius, Mauritius

Abstract

The emergence of the gig economy on a global stage has spawned key developments in Europe, America and other parts of the world. In countries, courts have sought to clarify employment relationships between platforms and workers, there are also issues with algorithmic decision making which weakens human rights and labour standards. Another common challenge is the lack of national legislation that can promote access to social security, minimum wage and other social insurance benefits. This study aims to examine how the principles of restorative justice can facilitate better redress for platform workers within the platform economy. The study adopted a restorative conference with the help of a facilitator which brought together workers and their family members, platforms, regulators, policymakers, and academics. The participants were selected based on an initial survey administered to over 200 app-based transporters (platform workers regarded as Uber/Bolt and other ride hailing companies) across Nigeria to survey their opinions on those that are responsible for the harms that they experienced on the job. The responses from the survey identified platforms and regulators and the community as those that are directly responsible for the harm experienced in platform work.

The identified responsible parties were invited to participate in the conference and were split into five groups representing five restorative justice principles including compensation, empowerment, safety, accountability and community involvement. Individual groups used a restorative inquiry or framework to determine the goals of a legal framework that will facilitate better redress for platform workers. A questionnaire was administered to group facilitators after the conference to receive feedback, results also indicate that participants felt that restorative justice is a valuable tool for social dialogue between workers and platforms, and that restorative justice can be used to address and repair harms that platform workers experience on the job. Analysis also demonstrates that restorative justice can achieve the goals of a legal framework that will facilitate better redress for workers within the platform economy. This research recommends that restorative justice can facilitate better redress for platform workers and can be a model for social dialogue or repairing corporate harm in platform work. Overall, this research suggests that restorative justice is needed to work and build solutions to achieve the sustainable development goals.

Keywords: platform economy, restorative justice, sustainable development, platform workers, app-based transporters.

Establishing Legal Frameworks for China-Africa Cooperation under the Belt and Road Initiative

Weidong Zhu

Director, Center for African Laws,
Institute of the West Asian and African Studies,
University of the CASS,
Beijing, the People's Republic of China

Abstract

China is currently advancing to build high quality Belt and Road with African countries and China has concluded 52 documents of jointly building the Belt and Road with African countries and the African Union (AU) up to now. Under the framework of the BRI, the investment, trade and people to people exchange between both sides are on the steady increase. With the frequent cross-border transactions between both sides emerged various legal issues. Based on the empirical analysis, the various legal issues between both sides are mainly cross-border crimes, civil and commercial disputes, as well as investment disputes, which require a comprehensive legal framework to deal with so as to guarantee the sound development of the BRI between both sides. But such a comprehensive legal framework does not exist between both sides at present to efficiently deal with the cross-border legal issues. Therefore, it is submitted that both sides negotiate and conclude more bilateral judicial assistance treaties in civil and commercial matters, in criminal matters and more bilateral investment treaties in future.

Key words: BRI, China, Africa, legal issues, bilateral judicial assistance treaties, BIT.

1. Introduction

China and African countries have a long history of friendship. Since the establishment of the Forum on China-Africa Cooperation (FOCAC) in 2000 there has been more and more civil and commercial exchanges between both sides. The Belt and Road Initiative (BRI) put forward by Chinese president Xi Jinping in 2013 offered another great opportunity for China-Africa cooperation. So far 52 African countries and the African Union (AU) have signed the BRI cooperation documents with China. China-Africa cooperation has entered a new stage under the BRI, which has witnessed a great increase of the civil and commercial exchanges between both sides. As a result, more and more legal disputes have arisen out of such frequent civil and commercial exchanges. The settlement of such cross-border disputes involving the African elements or the Chinese elements requires a comprehensive legal framework between China and Africa. The paper first examines the increase of the civil and commercial exchanges between both sides under the BRI, and then analyses the legal disputes arising from such exchanges; it further discusses the current legal framework between China and Africa, and last the paper put forwards some ways to improve the current legal framework to guarantee the sound development of China-Africa cooperation under the BRI.

2. The Increasing Civil and Commercial Transactions between China-Africa under the Belt and Road Initiative

China is the largest developing country and Africa is the continent with the largest number of developing countries in the world. Enhancing solidarity and cooperation with African countries has always been the cornerstone of China's independent foreign policy of peace, as well as China's firm and longstanding strategic choice. Therefore, the development of China-Africa friendly relations has always been an important part of China's diplomatic work. In the 1950s and 1960s, Chairman Mao Zedong and Premier Zhou Enlai, the first generation of the Chinese leaders since the founding of the People's Republic of China, together with the old generation of African statesmen at that time, have shown great foresight to establish diplomatic relations, thus opening a new era in China-Africa relations. Over the past five decades and more, the Chinese leaders of every generation have always been attaching great importance to China-Africa friendship and cooperation. In March 2013, President Xi Jinping paid his first state visit to Tanzania, South Africa, and Republic of Congo soon after assuming the Chinese presidency. At the early beginning of December, 2015, President Xi set his feet on African continent again in just three years. During this time, he visited Zimbabwe and South Africa, and chaired the FOCAC Johannesburg Summit in South Africa. President Xi put forward some principles and concrete measures to further develop China-Africa relations in his speeches delivered during his stay in Africa, which have been serving as guiding thought and principle to make China's policy towards Africa. ¹

The great attention that the Chinese government pays to its policy towards Africa is determined by its characterization of China-Africa relations. It was not until President Xi delivered his speech in Julius Nyerere International Convention Centre (JNICC) on 25 March 2013 that China has a clear characterization of China-Africa relations. In his speech entitled "Remaining Reliable Friends and Faithful Partners Forever" at the JNICC, President Xi put it straightforward that the history had taught us "China and Africa have always been a community of shared future". ²This is a highly concise characterization of China-Africa relations, and President Xi emphasized such a characterization once more in his opening remarks at the FOCAC Johannesburg Summit Opening Ceremony. Therefore, it is very necessary to grasp the essence and meaning of "China-Africa Community of a Shared Future" to have a better understanding of China's policy towards Africa.

The characterization of "China-Africa Community of a Shared Future" is based on the history, reality and future of both sides. The similar historical experiences, the shared strategic interests, as well as the common development tasks have bound the two sides closely together. The African people and the Chinese people forged a kind of brotherly friendship in their anti-colonial and anti-imperialist struggle for national independence and liberation; The development strategies between China and Africa are highly compatible: China and Africa need each other for cooperation and development given their respective advantages in production factors and their complementarity in economy, making them also a community of shared interest; the Chinese people are currently committed to realizing the Chinese dream of the great rejuvenation of the Chinese nation while African people are striving for the African dream of self-development through unity and growth. People in China and Africa should strengthen unity and cooperation and support and help each other to make their respective dreams come true.

1 http://www.focac.org/eng/zywx_1/zyjh/201512/t20151205_7933603.htm.

2 http://en.qstheory.cn/2020-05/19/c_490203.htm

The history, reality and future determine that China and Africa will be good brothers, good partners and good friends for ever, which best and vividly explains the essence and meaning of China-Africa community of a shared future. Good brothers mean sincerity and friendship, fully trusting each other; Good partners mean equality and mutual benefit, sharing weal and woe; Good friends mean mutual respect, standing together through thick and thin. However complicated the world situation becomes and whatever changes the international society goes through, the good brothers, partners and friends will nevertheless trust each other, support each other, treat each other equally and develop together. In such a sense, China-Africa community of a shared future is not only the basis but also the aim of China's policy towards Africa.

In order to consolidate and bolster China-Africa community of a shared future, the Chinese government released its second document of China's Africa Policy in December 2015, which provides China's overall policy towards Africa of establishing and developing comprehensive strategic and cooperative China-Africa partnership.³ Such a partnership requires equality and mutual trust in politics; cooperation and win-win in economy; exchange and mutual appreciation in culture; mutual assistance and support in security; and solidarity and coordination in international affairs. Part III of the second China's Africa Policy listed some feasible and concrete measures in seven areas to promote the all-round development of China-Africa cooperation. The release of the second China's Africa Policy from the Chinese government aims to further clarify China's determination and goodwill to develop friendly and cooperative relations with Africa and expound the new vision, approach and measures of China's policy towards Africa under the new circumstances, so as to guide the multi-faceted exchanges and cooperation between both sides in years to come. As can be seen that the overall China's policy towards Africa and the various concrete measures are fully compatible with the characterization of China-Africa relations, and they also absorbed and reflected the "Five Major Pillars" and "Ten Major Cooperation Plans" put forward by President Xi to develop the comprehensive strategic and cooperative China-Africa partnership in his opening remarks at the FOCAC Johannesburg Summit Opening Ceremony.⁴

In July, 2018, President Xi Jinping paid a state visit to Senegal, Rwanda, Republic of South Africa, and a friendly visit to Mauritius during a stopover. This is the fourth time that President Xi visited African countries after assuming his presidency. In his signed article published in the Senegalese media, President Xi said that China and African countries should join hands together to build a closer China-Africa community of a shared future. At the Beijing Summit of the FOCAC held at the beginning of September 2018, President Xi made it clear in his keynote speech at the opening ceremony that both sides will work together to build a closer China-Africa community with a shared future that assumes joint responsibility, that pursues win-win cooperation, that delivers happiness for all the people from both sides, that enjoys cultural prosperity, that enjoys common security and that promotes harmony between man and nature, in the face of such challenges as the persisting hegemony and power politics, the mounting protectionism and unilateralism, the plaguing war, conflicts, terrorism, famine and epidemics.⁵

To build such a closer community with a shared future, President Xi put forward that both sides should seize the opportunity created by the respective development strategies of each side and the

3 China's Second Africa Policy Paper is available at https://www.chinadaily.com.cn/world/XiattendsParisclimateconference/2015-12/05/content_22632874.htm.

4 http://www.focac.org.cn/chn/zywx/zyjh/201512/t20151205_8044420.htm.

5 http://www.focac.org.cn/chn/zywx/zyjh/201809/t20180904_7875883.htm.

major opportunities presented by the Belt and Road Initiative, and both sides should spare no efforts to ensure that the BRI and the AU Agenda 2063, the UN 2030 Agenda for Sustainable Development and the development programs of African countries better complement each other, so as to expand new areas of cooperation and unlock new cooperation potential. Additionally, President Xi announced in his keynote speech that China would launch eight major initiatives in close collaboration with African countries in the next three years which cover the industrial promotion, infrastructure connectivity, trade facilitation, green development, capacity building, health care, people-to-people exchange, as well as peace and security. These efforts will definitely promote the bilateral and multilateral relations between China and African countries, for example, just following the Beijing FOCAC Summit 37 African countries signed memorandum on jointly building the Belt and the Road with China.

More and More African countries have joined the BR Initiative after the Belt and Road construction entered the high quality development stage. On April 28, 2019, President Xi Jinping announced that extensive consensus was reached on promoting "high-quality cooperation" under the Belt and Road Initiative (BRI) at the closing of the Second Belt and Road Forum for International Cooperation (BRF) in Beijing.⁶ Since then, the Chinese government has promoted the high quality development of the Belt and Road on different occasions, and in particular, the Chinese government paid great attention to promote the high quality building of the belt and road between China and Africa. For example, in the Forum on China-Africa Cooperation Dakar Action Plan (2022-2024) concluded at the eighth Ministerial Conference of the FOCAC held on 29-30, November, 2021, "China welcomes African countries joining the big family of Belt and Road cooperation. China and Africa will continue to uphold the principle of extensive consultation, joint contribution and shared benefits, follow the philosophy of open, green and clean cooperation, and advance high-standard, people-centered and sustainable Belt and Road cooperation."⁷China-Africa joint building the belt and road has produced many practical results to the African countries, such as the infrastructure developed under the BRI which includes 10,000 kilometers of standard gauge railways, 100,000 kilometers of roads, and the establishment or refurbishment of 100 ports, as well as many schools and hospitals being put into operation.⁸Therefore, more African countries have shown interest in joining the BRI. So far, 52 African countries, together with the African Union, have signed BRI cooperation agreements with China.

With the development of China-Africa high quality joint building the BRI, the investment and trade between both sides have made great achievements. In the year of 2000, when the FOCAC was established, the trade volume between China and Africa just hit the US\$10 billion mark and the Chinese FDI stock to Africa did not reach over US\$500 million; In the year of 2013, when the BRI was first put forward by President Xi Jinping during his visit to the Republic of Kazakhstan and the Republic of Indonesia, the trade volume between China and Africa exceeded US\$200 billion for the first time, and the Chinese FDI stock to Africa reached over US\$27 billion; and after 10 years of the BRI, the trade volume between both sides has reached US\$282.1 billion, making China the largest trading partner of Africa in 15 consecutive years, and the Chinese FDI stock to Africa has exceeded US\$40 billion.⁹

6 <https://eng.yidaiyilu.gov.cn/p/88273.html>.

7 Para. 1.7 of the Dakar Action Plan (2022-2024).

8 http://www.china.org.cn/opinion/2023-09/07/content_113264970.htm.

9 <https://baijiahao.baidu.com/s?id=1789642896630190774&wfr=spider&for=pc>.

3. The legal issues arising from China-Africa Civil and Commercial Transactions under the BRI

The frequent business transactions between both sides have resulted in many legal issues such as civil and commercial disputes, trade and investment disputes, illegal migration, cross-border crimes, tax evasion, etc., which will have negative impact on China-African relations. To have a full understanding of the legal issues arising from China-Africa cooperation under the BRI, this section will first analyse the legal disputes involving the African elements in the Chinese courts, and then will turn to the legal disputes involving the Chinese elements in the African courts.

3.1. The Legal Disputes Involving the African Elements in the Chinese Courts

The legal disputes involving the African elements in the Chinese courts refers to those disputes in the Chinese courts in which either of both of the parties are from Africa, or the subject matters are located in Africa, or the facts creating such legal relationship, for example, the contract is concluded in an African country or the marriage in dispute is celebrated in an African country. Widely speaking, such disputes are the foreign-related ones or those with foreign elements. To be representative, five African countries from Northern, Southern, Western, Eastern and Central Africa are selected, namely, Egypt, South Africa, Nigeria, Uganda and DR Congo. These five African countries all have concluded BRI cooperation documents with China and they all have frequent business transactions with China.

I used the Chinese legal research engine www.pkulaw.com to collect the legal disputes involving the African elements in the Chinese courts. For this purpose, I will put into the key words such as “埃及 (Egypt)”, “南非 (South Africa)”, or “乌干达 (Uganda)”. Though the result from such research are not so precise, they may basically manifest the the legal disputes involving the African elements in the Chinese courts. When I put into the key word “埃及 (Egypt)”, I got 2070 concluded cases with “埃及 (Egypt)” during the period from 1986 to 2024, among which 1570 concluded cases are civil and commercial ones, 399 concluded cases are criminal ones, 83 concluded cases are administrative ones. Furthermore, most of the cases have occurred since 2013 when the Chinese government put forward the BRI and since then there were more and more frequent civil and commercial exchanges between China and Egypt. For example, from 1986 to 2012, 2011 saw the largest number of the cases which was 34; and in 2013 the number of the cases was 48; but after 2013, the number of the cases increase very much annually: 2014 (112), 2015 (124), 2016 (172), 2017 (174), 2018 (231), 2019 (250), 2020 (345). After 2020, due to the pandemic and the restrictions of travel adopted, there were not so many civil and commercial exchanges between China and other countries including Egypt, so the number of the cases decreased accordingly, for example, the number of the cases involving the Egyptian elements in the Chinese courts after 2020 were respectively, 2021 (218), 2022 (118), and 2023 (40).¹⁰

South Africa signed the BRI cooperation document with China in 2015, making it the first African country to sign such a document. By 2023, South Africa has been the largest trading partner of China in Africa for 13 consecutive years. The civil and commercial exchange between China and South Africa has been on the steady increase since the two countries established diplomatic ties in January 1998. To get more precise number of the cases involving the South Africa elements in the Chinese courts, I put the key words “南非共和国 (Republic of South Africa)” into the research

¹⁰ <https://www.pkulaw.com/case>.

engine and got 211 concluded cases. The largest three categories of the concluded cases related respectively with civil and commercial causes (152), criminal causes (37) and administrative cause (15). There is also an obvious increase of the number of the cases since 2013, which may be listed as 2013 (9), 2014 (24), 2015 (18), 2016 (12), 2017 (23), 2018 (23), 2019 (20), 2020 (20), 2021 (25), 2022 (5), 2023 (1).¹¹

The survey of the cases involving the elements of Nigeria, Uganda and DR Congo showed almost the similar scenario. From the analysis of the cases involving the African elements in the Chinese courts, a few observations may be made. First, the disputes involving the African elements in the Chinese courts are mainly civil and commercial ones, and criminal ones; secondly, there is a sharp increase of the disputes involving the African elements in the Chinese courts since 2013 when the BRI was put forward; and thirdly, the courts within whose jurisdiction there are more civil and commercial exchanges with the African countries are seized with more disputes with the African elements, which further evidences that more frequent civil and commercial exchanges will perhaps bring more disputes.

3.2. The Legal Disputes Involving the Chinese Elements in the African Courts

It is not easy to get a full understanding the legal disputes involving the Chinese elements in the African courts, taking into account the fact that in many African countries the judgments of the courts are not available on the internet. The author tries to find some judgments involving the Chinese elements from the courts in Uganda and South Africa.

I put the key word “China” into the legal research engine of Uganda Legal Information Institute (ULII) and got 193 judgments made in the Ugandan courts, among which most are civil and commercial judgments and then the criminal judgments ranked second.¹² For the legal disputes involving the Chinese elements in the South African courts, I put the key word “China” into the legal research engine Southern African Legal Information Institute (SALII) and got 721 results, most of which are judgments from Southern African courts (most of them are from South Africa courts) and a few of which are documents or legislation with the key word “China”. As can be seen from the judgments made in the South African courts, most of them are civil and commercial ones and some of them are criminal ones.¹³

From the above analysis of the legal disputes arising from China-Africa cooperation, it is clear that most of the legal disputes concerned the civil or commercial matters, the criminal matters, or the tax issues. And the legal disputes arising from China-Africa cooperation under the BRI grew steadily in the past few years, except during the period of the Covid pandemic when there were restrictions of international travels.

4. The current legal framework of China-Africa Cooperation under the BRI

The frequent civil and commercial transactions between both sides has resulted in many legal issues in recent years, such as those arising from contract, cross-border marriage, foreign investment, illegal immigration and cross-border crimes, etc. The settlement of those legal issues will definitely have great impact on China-Africa trade and investment. Many legal scholars have

¹¹ <https://www.pkulaw.com/case>.

¹² https://ulii.org/search/?q=China&doc_type=Judgment.

¹³ <https://www.saflii.org/cgi-bin/sinosrch-adw.cgi?query=China>.

recognized the role that law plays in China-African business relations and have appealed the governments from both sides to take serious the legal issues arising from such relations to create a favorable legal environment for the sustainable development of such relations.¹⁴ Fortunately, top officials from both sides have realized the negative effect of the legal issues arising from the business relations and have attached much attention to their settlement. For example, the documents adopted at the Forums on China-Africa Cooperation (FOCAC) indicated that the legal exchange of legal professionals from both sides should be increased, judicial cooperation should be extended, and investment and trade disputes should be settled amicably.

The author once proposed that as a first step the governments from both sides should negotiate and conclude more relevant bilateral treaties to build a comprehensive legal framework for settling those legal issues; Secondly, the law enforcement authorities from both sides should strengthen their cooperation and work together to solve those legal issues; Finally, the exchange of the legal professions from both sides should be improved and the law-abiding awareness should be enhanced among the economic actors from both sides as a result of more legal exchange and more knowledge of the legal systems from both sides in future.¹⁵ In this section, focus will be specifically put on the current legal framework governing the bilateral civil or commercial matters, investment, criminal matters and taxation issues between China and Africa. When settling such disputes, it will be indispensable to look for help from such treaties as those on judicial assistance, on extradition, on investment protection, etc. However, there are few and limited such treaties between China and African countries, and some of them need to be improved to be practical and efficient.

3.1 The bilateral treaties on judicial assistance in civil and commercial matters between China and African countries

The civil and commercial disputes between China and Africa are increasing due to the frequent business contacts. According to the survey that I previously made, such disputes are mainly categorized as contractual disputes, disputes involving credit letter and letter of guarantee, delict, maritime disputes and disputes concerning marriage and family.¹⁶ The settlement of such disputes will necessarily involve such issues as the service abroad of judicial documents, the taking of evidence abroad, and recognition and enforcement of foreign judgments, which are ordinarily dealt with in international conventions or bilateral treaties.

The Hague Conference on Private International Law adopted the Hague Convention on the Service Abroad of Judicial or Extrajudicial Documents in Civil or Commercial Matters (Hague Convention on the Service Abroad) on 15 November 1965 and Hague Convention on the Taking of Evidence Abroad in Civil or Commercial Matters (Hague Convention on the Taking of Evidence Abroad) on 18 March 1970, respectively, to improve the cooperation in international civil and commercial litigations between different countries. China acceded to the said treaties in March 1991 and July 1997. So far China can carry out service abroad with 67 countries and regions and the taking of evidence abroad with 42 countries and regions in terms of the said treaties.¹⁷ Whereas in Africa

14 Mancuso "China in Africa and the Law" 2012 Annual Survey of International and Comparative Law 243 ff; Kiggundu "Assessment and Management of the Legal and Judiciary Systems for Advancing China-Africa Economic Relations" paper submitted to the Workshop on China-Africa Relations: Towards Sustainable Chinese Investment in Africa held in the University of Hong Kong on 6-7 May 2011; Zhu "OHADA: As a Base for Chinese Further Investment in Africa" 2009 Penant 421 427.

15 Zhu Weidong, Creating a Favorable Legal Environment for the Sustainable Development of China-African Business Relations, *Tydskrif Vir Die Suid-Afrikaanse Reg*, No.2, 2014.

16 Zhu "A Brief Analysis of the Disputes Arising from China-African Civil and Commercial Transactions" 2012 *Journal of Cambridge Studies* 75-78.

17 In order to implement these conventions and treaties efficiently, the Trial Committee of the Supreme People's Court of China adopted the Provisions on the Service of

only South Africa and Seychelles are parties to Hague Convention on the Taking of Evidence Abroad, and only Egypt, Botswana, Malawi and Seychelles are parties to the Hague Convention on the Service Abroad. Therefore, obviously it will not be satisfactory to carry out the service and the taking of evidence between China and African countries through the treaties channel considering the limited number of the African parties to the said treaties, though China is a party to each of them. As a result, it will be an alternative for China to cooperate with African counterparts in international civil and commercial litigation by the way of bilateral treaties on judicial assistance in civil or commercial matters.

But at present only a few African countries have concluded such bilateral treaties with China and they are all from North Africa, namely, Morocco,¹⁸ Tunisia,¹⁹ Egypt,²⁰ and Algeria.²¹ Other African countries which have frequent civil and commercial transactions with China and which have a large number of Chinese immigrants have not yet concluded such bilateral treaties with China, for example, South Africa, Sudan, Nigeria, Angola, Guinea, Ghana, Zambia, Tanzania, Botswana, Zimbabwe, Uganda,²² where the courts will find it difficult or even impossible to carry out service abroad or the taking of evidence abroad when the disputes between its people or businesses and their Chinese counterparts arise, which will affect not only the efficiency of the dispute-settlement process but even the merit of the dispute.

Additionally, there are still some loopholes or ambiguities in the four existing bilateral treaties, for example, the jurisdiction of the courts from each side to deal with the cases involving the element from the other side is clearly provided in the treaty between China and Tunisia, while such a stipulation is omitted from the treaties between China and Morocco, and Algeria. The ascertainment of the international jurisdiction is not only the first step of international civil and commercial litigation but also will decide whether the foreign judgment should be recognized or enforced. Taking into account the great differences in the jurisdictional rules over foreign-related cases between China and some African countries, it is very necessary that they be clearly defined in the bilateral treaties, which will help to define the court's jurisdiction in case of a dispute, promoting the efficiency of the dispute settlement and the possibility of the recognition and enforcement of the judgments made by the courts from the other side. Otherwise, it will cause much inconvenience to the parties participating in the cross-border business transactions. For example, in April 2015, a Chinese court in Hunan Province denied the recognition and enforcement of a judgment delivered by a commercial court in Chad on the ground that there is no bilateral judicial assistance treaty and no reciprocity between both sides; in the same year a Chinese court in Jiangsu Province refused to accept the divorce litigation between two Ethiopian nationals; in 2013, a Chinese court in Zhejiang Province also refused to accept a commercial litigation brought by a Chinese party concerning the legal disputes arising in Uganda due to the fact that the same party has filed a lawsuit in a High

Judicial Documents and the Taking of Evidence Abroad in Civil and Commercial Matters at its 1568th session on 21 January 2013. This Provision which served as a kind of judicial interpretation has come into force as of 2 May 2013.

18 The Agreement on Judicial Assistance in Civil and Commercial Matters between China and Morocco was concluded 16 April 1994 and came into effect as of 26 November 1999.

19 The Agreement on Judicial Assistance in Civil and Commercial Matters between China and Tunisia was concluded 4 May 1999 and came into effect as of 20 July 2000.

20 The Agreement on Judicial Assistance in Civil, Commercial and Criminal Matters between China and Egypt was concluded 21 April 1994 and came into effect as of 31 May 1995.

21 The Agreement on Judicial Assistance in Civil and Commercial Matters between China and Algeria was concluded 10 January 2010 and came into effect as of 10 February 2010.

22 For the number of the Chinese migration in African countries, see Park "Chinese Migration in Africa" <http://dspace.cigilibrary.org/jspui/bitstream/123456789/29711/1/SAIIA%20Occasional%20Paper%20no%202024.pdf?1> (25-8-2013).

court in Uganda and it was still pending in the Ugandan court. If there were bilateral judicial assistance treaties in civil and commercial matters between China and the above mentioned countries, it will be more easy for the court to determine whether it can exercise jurisdiction over the matters concerned and whether it can recognize and enforce the foreign judgment at issue.

3.2 The bilateral investment treaties (BITs) between China and Africa

As capital-importing countries, African countries have concluded many BITs with other countries in order to attract foreign investments. In case of investment disputes the foreign investors will usually submit them to international arbitration in terms of the BITs, for example, the respondents in many cases that the ICSID has accepted are the governments of African countries.²³ To date, there has been two investment disputes in which the Chinese investors instituted arbitration against the Nigerian government and the Ghanaian government respectively.²⁴ It is high likely that more Chinese investors would seek remedies from ICSID arbitration in near future, considering the fact that Africa has become the fourth largest destination for the Chinese investment and China has become the third largest capital-exporting country to Africa.

As early as in October 1989 China concluded a BIT with Ghana which is the first BIT between China and an African country. Subsequently China has concluded 35 BITs with African countries, and 22 BITs with the following African countries have come into effect: Ghana, Egypt, Morocco, Mauritius, Zimbabwe, Algeria, Gabon, Nigeria, Sudan, South Africa, Cape Verde, Ethiopia, Tunisia, Equatorial Guinea, Madagascar, Mali, Mozambique, Republic of Congo, DR Congo, Cameroon, Tanzania, Zambia,; while the other 13 BITs with the African countries below have not yet come into effect: Angola, Botswana, Sierra Leon, Kenya, Cote d'ivoire, Djibouti, Benin, Uganda, Guinea, Seychelles, Chad, Libya, and Namibia.²⁵ All the above BITs were concluded at different period and cover all the types of the three-generation BITs that China concluded.²⁶

Since China's investment has spread over 50 African countries, it is obvious that the 22 effective BITs will not provide satisfactory protection to the Chinese investors. Especially, many African countries that receive more investment from China have not concluded such BITs with China, or such BITs have been concluded but they did not come into effect yet, for example, the BITs between China and Angola, South Sudan, Zambia, Uganda, Kenya, etc. Therefore, both sides "will continue to push forward negotiations and implementation of bilateral agreements on promoting and protecting investments, foster an enabling investment environment and safeguard the legitimate rights and interests of investors of both sides".²⁷ Furthermore, the BITs that China concluded with African countries did not pay much attention to the political unrest or riot that occasionally happened in some African countries, nor did they reflect the actual situation that the Chinese investment came across in Africa, for example, the issue of the environment protection, the treatment of the labors. Therefore, in future when China conclude new BITs with African countries or the existing China-Africa BITs are revised, such issues concerning labor, environment, corporate social responsibility should be included based on the latest development of international investment

²³ According to the data the author collected from the website of the ICSID, by 9 August 2013 in the 269 decided cases of ICSID there are 67 cases concerning African countries with a ratio of 25%; in the 168 pending cases there are 32 cases concerning African states, about 19% of the total number.

²⁴ *Zhongshan Fucheng Industrial Investment Co. Ltd. v. Federal Republic of Nigeria*; *Beijing Everyway Traffic and Lighting Company Limited v. Ghana*, PCA 2021-15.

²⁵ <https://investmentpolicy.unctad.org/international-investment-agreements/countries/42/china>.

²⁶ For a general analysis of the three-generation China-Africa BITs, see Kidane *China-Africa Dispute Settlement: The Law, Economics and Culture of Arbitration* (2012) 199-203.

²⁷ Par 4.2.2 of the fifth Ministerial Conference of Forum on China-Africa Cooperation Beijing Action Plan (2013-2015) adopted on 23 July 2012.

law worldwide,²⁸ and such concepts as “investment”, “investor”, and “expropriation” be redefined taking into account of the actuality of China-Africa investment; and the legal tradition in China and African should be attached more attention in designing the dispute-settlement clause so that a dispute-settlement mechanism with China-African characteristics may be built.²⁹

3.3 China-Africa bilateral treaties on judicial assistance in criminal matters and on extradition

Judicial assistance in criminal matters can be understood in the broad and narrow sense. The judicial assistance in criminal matters in the narrow sense refers to the legal assistance in connection with the service of criminal judicial documents, taking testimony, examining the persons, items or places that is relevant to the trial upon the request by the other country; while in broad sense it includes not only the judicial assistance in the narrow sense but also the extradition of the suspects. In China the judicial assistance in criminal matters is narrowly understood, and China will usually conclude separate treaty on judicial assistance in criminal matters and treaty on extradition with other countries to govern them respectively.

Due to the high frequency of cross-border crimes it is inevitable for different countries to cooperate in combating such crimes, especially in the form of judicial assistance in criminal matters under bilateral treaties. Up to May 2024, China has only 9 effective treaties on judicial assistance in criminal matters with Namibia, Algeria, Tunisia, South Africa, Republic of Congo, Kenya, Senegal, Mauritius and Egypt, and 13 effective treaties on extradition with Namibia, Algeria, Ethiopia, Lesotho, Tunisia, South Africa, Morocco, Republic of Congo, Kenya, Senegal, Mauritius, Botswana and Angola.

The above treaties paved the way for China and African countries to carry out cooperation in criminal matters, which plays an active role in fighting against the cross-border crimes. According to the reports, there are many crimes against the Chinese people or enterprises in many African countries in recent years.³⁰ Because there are no treaties on criminal judicial assistance between China and many other African countries, the crimes against the Chinese people or enterprises will not be effectively cracked down and contained. For those crimes against the Chinese people or enterprises committed by the Chinese criminal gangs in many African countries, China may consider concluding more treaties on extradition with African countries so that the Chinese criminals can be extradited to China and brought to justice in China.

3.4 China-Africa Double Taxation Treaties (DTI)

Another question worth noting is that with the development of China-Africa business transactions how the double taxation can be avoided. Double taxation is the levying of tax by two or more jurisdictions on the same declared income (in the case of income taxes), asset (in the case of capital

28 Kidane and Zhu “China-Africa Investment Treaties: Old Rules, New Partners” (forthcoming) *Fordham International Law Journal*.

29 Zhu “Arbitration as the Best Option for the Settlement of China-African Trade and Investment Disputes” 2013 *Journal of African Law* 149 159.

30 The author has collected many reports about the crimes against the Chinese people or enterprises in Africa from the internet, for example, in April 2007 more than 200 armed people attacked a Chinese oil field in Ethiopia, 9 Chinese workers were killed and another 7 Chinese workers were kidnapped; in September 2007, two Chinese workers in a Chinese owned business were robbed and killed; in January 2011, six gunmen in Congo robbed a mining vessel owned by Chinese people, one Chinese was killed and another Chinese was hurt; in February 2011, more than 200 Chinese workers of a Chinese company investing in Libya fought against over 50 gunmen in order to protect the company’s assets and many of them were injured in this attack; in October 2011, two Chinese companies in Tanzania were robbed by the gunmen and one Chinese worker was killed, and another Chinese businessman was robbed and killed at the same time in Angola; in July 2012, a Chinese worker was killed in a Chinese construction site in Uganda.

taxes), or financial transaction (in the case of sales taxes). This double liability is often mitigated by tax treaties between countries. On 1 August 1994 China concluded the first double taxation treaty with an African country, namely, Mauritius. Afterwards China concluded 20 such treaties with Sudan (30 May 1997), Egypt (13 August 1997), Seychelles (26 August 1999), Nigeria (15 April 2002), Tunisia (16 April 2002), Morocco (27 August 2002), Algeria (6 November 2006), Ethiopia (14 May 2009), Zambia (26 July 2010), Uganda (1 January 2012), Botswana (11 April 2012), Zimbabwe (1 December, 2015), Kenya (21 September, 2017), Gabon (1 September, 2018), Republic of Congo (5 September, 2018), Angola (9 October, 2018), Rwanda (7 December, 2021), Senegal (17 October, 2023), and Cameroon (17 October, 2023), successively, but the treaties with Uganda, Kenya, Gabon, Senegal and Cameroon have not come into effect yet.³¹ Many of the African countries with double taxation treaties with China are those having frequent economic contacts with China and the conclusion of such treaties will promote further the exchange of economy, technology and human resources. But here the question still remains: the African countries with such treaties with China is limited in number, and China may propose to conclude such treaties with such African countries as Tanzania, Ghana, etc, which have attracted a large amount of the Chinese investment in recent years.

5. The Ways to Improve Legal Framework for China-Africa Community with a Shared Future

A comprehensive legal framework for China-Africa Community with a shared future will usually consist of a set of clear and predictable legal norms and a suitable dispute resolution system. At present, the following steps may be taken to improve such a legal framework.

First, China and more African countries should be involved in negotiating and concluding bilateral treaties on judicial assistance in civil, commercial and criminal matters, extradition, double taxation and investment promotion and protection, and making great efforts to put the signed bilateral treaties on the above matters into effect. From the number of the cases involving the African elements in the Chinese courts in recent years, we can see that the transnational civil, commercial and investment disputes and the transnational crimes increased very fast especially since 2000 when the FOCAC was established, and the disputes and crimes involved the parties almost from all African countries. The lack of bilateral treaties will impede the smooth resolution of the transnational civil and commercial disputes and will have negative effect on the effective crack down against the transnational crimes.

Second, there should be a co-ordinating group for China-African business disputes, composed of lawyers and experts who are familiar with international trade and investment laws and practices from China and African countries. This group would provide legal services to those intending to invest or trade in those countries and provide legal assistance in the event of a dispute. Alternatively, a China-African legal information centre could be established, which would offer businessmen on each side easy access to the legal information that they need.

Third, as regards the dispute resolution for the disputes arising from China-Africa business relations, the author once proposed in an article that arbitration is the best option for the settlement of such disputes, taking into account of the disadvantages of litigation in Africa, the advantage of

³¹ information from the website of China State Administration of Taxation https://www.chinatax.gov.cn/chinatax/n810341/n810770/common_list_ssty.html.

arbitration in Africa, the legal tradition and legal culture of both sides, as well as the encouragement from both sides to settle contractual disputes through arbitration that expressed in the Action Plans adopted at different FOCAC Ministerial Conferences. In order to encourage the use of arbitration as a means of dispute settlement, China Law Society adopted the Mutual Appointment of Arbitrators Plan in 2011, which called on the arbitral institutions in Africa to appoint arbitrators from China and the arbitral institutions in China to appoint arbitrators from African countries, so that the parties from either side will be more willing to choose to arbitrate their disputes in the arbitral institutions where they can designate the arbitrator from their own country.

Para.6.2.6 of the Johannesburg Action Plan (2016-2018) adopted at the Johannesburg FOCAC Summit in 2015 stated that “the two sides will work together to establish a China-Africa Joint Arbitration Center (CAJAC).³² Almost at the same time of the Johannesburg FOCAC Summit, the Shanghai Center and Johannesburg Center of the CAJAC were set up in Shanghai and Johannesburg, respectively, under the joint sponsorship of Shanghai International Commercial Center and Arbitration Foundation of Southern Africa. Subsequently, the Beijing Center, Shenzhen Center and Nairobi Center of the CAJAC were established in 2017 and 2018. According to the Beijing Action Plan (2019-2021) adopted at the Beijing FOCAC Summit held in September 2018, “the two sides will continue to improve the China-Africa joint arbitration mechanism, the China-Africa Joint Arbitration Center and its office network in Africa, and raise its international standing”.³³ In the Dakar Action Plan (2022-2024), “The two sides will support holding a China-Africa Forum of Law School Deans, encourage and assist Chinese and African universities in jointly building China-Africa legal research centers and training bases for legal professionals, and increase research on legal systems related to cooperation between China and Africa on the Belt and Road Initiative as well as on digital economy, smart cities, clean energy, 5G and other new business forms.”³⁴

Last, considering the particularities of the investment disputes between investors and states in the context of China-Africa business relations, it is not advisable to submit such disputes to the International Center for the Settlement of Investment Disputes (ICSID) established under the 1965 Washington Convention on the Settlement of Investment Disputes between States and Nationals of Other States (1965 Washington Convention), as the author and many other legal scholars have pointed out, that the arbitrators or mediators of the ICSID proceedings are usually from western countries who have little knowledge about the legal tradition and legal culture in African countries and China; the ICSID proceedings often took place in the European or American cities which will cause great economic burden to some African countries; more and more African countries are hesitant to submit investment disputes to ICSID, even some of them have withdrawn from the ICSID; Also the restrictions from China-Africa BITs are another obstacle to make use of the ICSID. Therefore, the author once proposed that China and Africa work together to set up a China-Africa Center for the Settlement of Investment Disputes (CACSID) in future under the framework of FOCAC or China-Africa Development Fund.

³² http://www.focac.org.cn/eng/zywx_1/zywj/201512/t20151225_7933575.htm.

³³ http://www.focac.org.cn/eng/zywx_1/zywj/201809/t20180912_7933578.htm.

³⁴ Para.6.2.7 of the Dakar Action Plan (2022-2024), available at http://www.focac.org.cn/eng/zywx_1/zywj/202201/t20220124_10632444.htm.

6. Conclusion

Only a favorable legal environment with comprehensive legal framework, strict law-enforcement and a high degree of law-abiding awareness among the individual actors can create a safe, orderly and stable environment for China-Africa cooperation under the BRI. As can be illustrated from the above analysis, as regards China-Africa business relations, the legal framework is still under construction and far from comprehensive for regulating such relations; some of the treaties between both sides are not strictly implemented; and the law-abiding awareness of the economic actors needs to be improved. It is therefore submitted that the relevant authorities of China work with its African counterparts to conclude more treaties on judicial assistance in civil, commercial and criminal matters, and on extradition, investment protection, avoidance of double taxation, etc., to build a comprehensive legal framework; the law-enforcement authorities make great efforts for the strict implementation of the existing treaties to guarantee the legal and reasonable rights and interests of the people or enterprises from the other side; and the legal scholars or practitioners between both sides take active part in joint research programs in the legal issues relating to illegal immigrants, cross-border crimes, commercial corruptions, the dispute settlement, etc., which will have negative impact on the sustainable development of China-Africa cooperation under the BRI.

Distance Learning in Times of Crisis and the Changes towards Digitalization

Simona Grigaliūnienė
Lithuania Business College
Klaipėda, Lithuania

Jurgita Martinkienė
Lithuania Business College
Klaipėda, Lithuania

Rajendra Parsad Gunpath
University of Mauritius
Reduit, Mauritius

Abstract

Disruption of classical educational processes and emergency transition to distance learning were the two major trends for the educational systems worldwide in the context of the pandemic and the effect of COVID-19 to economic, social, and political index is still unknown for sure and it is hard to prognose. This sudden change which was provoked by unplanned conditions highly effected the education system participants. Majority of HEIs in Lithuania had no major challenges or had overcome them to transfer the learning process into the distance learning, but for the schools then contact education was replaced by other forms of education, several difficulties arose like lack of technological resources such as computers, other access devices or the internet. Higher education institutions identify student internships, laboratory work and practical classes, which are only partially possible at a distance, as one of the biggest concerns. Distance learning requires a more disciplined and motivated student, as well as a greater adherence to ethical norms. For every teacher, it is important to know how artificial intelligence will change the study process, independent assignments, or the assessment system. The education system needs to find ways to integrate the IoT into the learning process and reap its benefits.

Keywords: distance learning, COVID-19, digitalization, perspectives.

1. Introduction

First time in the world COVID-19 was diagnosed as disease in Wuhan city (China) in 2019 December. It was stated that COVID - 19 is an infection disease which is caused by virus SARS-CoV-2, rapidly disseminated globally, prompting its declaration as a pandemic on March 11, 2020 (Gorbalenya et al., 2020). This virus soon spread in the whole world causing tremendous sickness rate also paralyzing health care system with increased level of patients. In 2020 COVID-19 has been declared as a pandemic by the World Health Organization and people in all countries (including Lithuania from 16th of March) there under quarantine to reduce the spread of the virus and stop the pressure to the medical resources.

Due to the announce of the quarantine all education systems had to be reorganized in a short period of time from direct (including social, physical, and professional) to distant. This sudden change which was provoked by unplanned conditions highly effected the education system participants. The world has never been so undertaken by such dramatic effect to human capital. And thought the effect of COVID-19 to economic, social, and political index is still unknown for sure and it is hard to prognose,

but many authors and international organizations claim that it will be dramatic (UNESCO, 2020, Verschuur et al., 2021, Cotula, 2021, Careres et al., 2020). Not all the higher education Universities or Collages were prepared for this unexpected situation, the most unprepared and mostly effected in this situation were schools (Jusiene et al., 2020). Kaiser et al. (2021) stated that largest impact was done for the most vulnerable children, including children with learning and/or physical disabilities, children from low-income families etc. Disruption of classical educational processes and emergency transition to distance learning were the two major trends for the educational systems worldwide in the context of the pandemic (Radina and Balakina, 2021). Bergdahl and Nouri (2020) has stated that while schools were not pedagogically prepared for the transition into temporary distance education, less hybrid forms of teaching, during the out-brake of COVID-19, as a leap for experiences gained and lessons learned for the developing preparedness plans. Digital transformation in higher education was forced to accelerate due to COVID-19 crisis, but also become as important key success factor for this transformation (Aljanazrah et al., 2022).

2. Analyses of Research papers on Distance Learning

The term “distance education” or “distance learning” investigated and applied by many different researchers for many years to a great variety of programs, forms, media, considering various theories and philosophies of distance education (Sherry, 1995). Various terms involved with online delivery methods can be seen in Table 1.

Table 1. Definition of Online Delivery Methods

Term	Definition
Distance learning.	The term distance learning represents approaches that focus on opening access to education and training, freeing learners from the constraints of time and place (Bušelič and Mirkovič, 2012). The basic definition of distance learning considers that the teacher and the students are separate in the spatial dimension and that this distance is filled by using technological resources (Casarotti, Filliponi, Pieti & Sartori, 2002).
Asynchronous online learning	A course where most of the content is delivered online and students can participate in the online course from anywhere at any time. There are no real time online or face-to-face meetings (Martin and Oyarzum, 2017).
Synchronous online learning	A course where most of the content is delivered online and students can participate in courses from anywhere. There are real time online meetings and student’s login from anywhere but at the same time to participate in the course (Martin and Oyarzum, 2017).
MOOC	These are Massive Open Online Courses where an unlimited number of students can access the open-source content free of cost (Martin and Oyarzum, 2017).
Blended/Hybrid	A course with a combination of face-to-face and asynchronously online delivery with a substantial portion of the course delivered online (Martin and Oyarzum, 2017).
Blended Synchronous	A combination of face-to-face and synchronously online students in the course (Martin and Oyarzum, 2017).
Multi-Modal	A combination of synchronous and asynchronous online learning in the course (Martin and Oyarzum, 2017).

Distance learning (DL) programs in an online class setting has become a popular platform, due to the internet and web-based technologies (Motiwalla and Tello, 2000). Mubarak et. Al. (2014) has stated that E-learning is naturally suited to distance learning, flexible learning, but can also be used in conjunction with face-to-face teaching, in which case the term Blended learning is commonly used. Generations X, Y and Z students produce different students' satisfaction levels and according to that there could a strategy to enhance student learning experience and satisfaction (Yawson and Yamoah, 2020). Holzer et al. (2021) stated that digital learning platforms can be used to enable online group work at a physical distance, also to foster the feeling of learning together as a group, synchronous learning units (e.g., video group calls) could be used to reflect on learning processes, successes, as well as struggles and to promote cohesion within the group. In 2020 was the rise of new video conferencing favourites, the current front-runner become Zoom, replacing earlier popular and used in distance learning programs like Skype and WhatsApp (Baggaley, 2020).

But within the COVID-19 pandemic the rase of cyber-attacks has tremendously increased and cases then using online meeting tools, such as Zoom, since personal data from user were sent to Facebook and some classes were hacked by trolls posting offensive and hateful content (Peters et al., 2020). Also, the privacy and civil rights of students were affected by the usage of the exam proctoring software (Dawson, 2023). Appropriate supports (high-speed internet) and quality use of technology (knowing how to navigate the technology) is stated as the reasons causing the disadvantages for students in completing their online work or attending online classes (Phirangee and Foster, 2024). Some authors state that the distance learning is excellent as an additional and support methodology but do highlight the ineffectiveness of completely remote teaching (Capone and Lepore, 2021).

3. Distance Learning Challenges in Lithuania

In spring 2020, the Lithuania country's lecturers and students, had to cope with the changes by moving their lectures and tutorials to a virtual space in less than one week. The growth of distance learning started with 10% of learners in 2011 and grew to 15% in 2016 and 90% in 2020 (Department of Statistics, 2020). Due to these unexpected changes various surveys were outgoing to see what challenges higher education institutions did faced and how fast they managed to deal with it. Lithuania Study Quality Evaluation Centre had organized the survey aimed to find out how Lithuanian HEIs managed to move their activities to the virtual space, what decisions had to be made, what additional activities had to be undertaken, how the whole process was carried out, what challenges were faced and how they were dealt with. There was also interest in the positive aspects of distance learning and the possibilities for the future.

Following the quarantine, all HEIs surveyed reported that they had moved most of their activities to virtual space. Lectures, seminars, settlements, individual consultations have been replaced by virtual face-to-face lectures, and materials have been hosted on the platforms they use (Moodle as the main platform used most often, cited by 82% of respondents, followed by MS Teams and Zoom). Some of the study material was pre-recorded in various repositories, but real-time contact with students is maintained for individual counselling, feedback, etc. The defense of the final thesis is also planned to be conducted remotely (Organizing studies and study-related activities at a distance, 2020). HEIs perceived the transition to distance learning as a relatively smooth and fast process. Following the quarantine on 16 March 2020, a higher proportion of HEIs reported that they started their studies and study-related activities at a distance immediately, within one to two working days (48% of respondents), while the rest reported that they started their studies and study-related activities within a week (22%) or two (30%).

The majority of HEIs (61%) said that no major challenges had been or had been overcome. The remainder said that problems were being dealt with gradually. Some of the HEIs that experienced challenges had already been distance learning before, so the transition did not require much effort (Organizing studies and study-related activities at a distance, 2020). But we can see a totally different

situation talking about Lithuanian schools. In the first phase, when contact education was replaced by other forms of education, several difficulties arose. Not all pupils were able to access distance education due to a lack of technological resources such as computers, other access devices or the internet. The Ministry of Education, Science and Sport estimated that as many as 35,000 pupils did not have such access. For these pupils, education was not provided remotely (Jusiene et al., 2020). The transition to full distance learning has also presented challenges for higher education institutions, some of them bigger and others smaller (Table 2).

Table 2. Biggest challenges higher education institutions had to take during distance learning (Organizing studies and study-related activities at a distance, 2020).

No.	Challenges
1.	Study process reorganization
2.	Psychological feeling and outside surroundings
3.	Part of lecturers, students were against distance learning
4.	Study quality
5.	Final theses defend
6.	Foreign students learning (different time zones)
7.	Planning future, upcoming semester
8.	Increased work for lecturers and students
9.	Providing IT sources, good internet connection
10.	Student evaluation (academic conscientiousness)
11.	Practical work, laboratories, practice

Higher education institutions identify student internships, laboratory work and practical classes (39%), which are only partially possible at a distance, as one of the biggest concerns. Although HEIs reported using virtual student testing, assessing student achievement (22%) and ensuring fair learning remain a major challenge. This relates primarily to final thesis defenses, which HEIs identified as a separate important issue. HEIs also mentioned international students who are currently outside Lithuania and have difficulties in attending contact virtual lectures due to time zone differences. Foreigners staying in Lithuania are also more likely to need help, such as psychological support. HEIs noted that, in general, distance learning requires a higher level of student discipline and motivation, as well as adherence to ethical norms. HEIs note that, in general, distance learning requires a more disciplined and motivated student, as well as a greater adherence to ethical norms. In addition to the challenges they face, all HEIs identified positive aspects of the transition to distance learning (Organizing studies and study-related activities at a distance, 2020). The challenges of distance education have been mitigated by the school administration's effective handling of change and emergencies, as well as by ensuring smooth communication between all members of the school community. School-family cooperation is another prerequisite for a smooth distance education process (Jusiene et al., 2020).

4. Distance Learning Changes Towards the Digitalization

Digitalization is one of the most talked-about topics today. However, when discussing the many forms digitization can take, it is often forgotten that this process is only the beginning of more complex and exciting changes that will inevitably also affect the learning process and was one of the key points shifting the learning process much faster to the distance learning. Main advantages of distance learning are the flexibility and accessibility of online education, individual approach, and cost-effectiveness (Tsybenko et al., 2022). The COVID-19 pandemic has forced the institutes to adopt the online teaching methods and the digital technologies have emerged as the savior of education in this critical time. The abilities that students due require like professional performance, such as problem-solving, thinking structure creation, and process comprehension are developed

through the assistance of digital technologies (Haleem et al., 2022). But the part of the artificial intelligence ChatGPT has sparked a wave of debate among teachers and other education professionals around the world. For every teacher, it is important to know how artificial intelligence will change the study process, independent assignments, or the assessment system. The use of the IoT in everyday life, in scientific and work processes, is gaining momentum. The education system needs to find ways to integrate the IoT into the learning process and reap its benefits. Researchers at the Massachusetts Institute of Technology have already developed an interactive version of a school curriculum that uses chatbots and allows the student to interact, ask questions and revisit tasks many times before they are learned. So gradually, people will be introduced to the use of IoT from an early age and will grow and develop with it. Indeed, how successful this integration of the IoT into the learning process will have a major impact on the future direction of the education system. Advances in the IoT mean that more and more subjects will be able to be learned on the same platform, on our own, and this will allow for more and more sophisticated concepts to be taught in higher education, which will raise the level and quality of the learning process. In the future, the researchers believe that IoT will be integrated into almost every curriculum: it is likely that we will have our own chatbots for courses, which will have access to its material, and students will be able to ask the chatbots all generic and course questions. However, it is likely that changes in the delivery of learning material will take time, as new technologies are ahead of the educational system.

5. Conclusions

Due to the announce of the quarantine all education systems had to be reorganized in a short period of time from direct (including social, physical, and professional) to distant. This sudden change which was provoked by unplanned conditions highly affected the participants. Digital transformation in higher education was forced to accelerate due to COVID-19 crisis, but also become as important key success factor for this transformation and lately enforced the even bigger integration of AI advances. The move to distance learning in Lithuania has been identified as a challenge that has led to an increased workload for lecturers and has raised several questions about study activities. Higher education institutions identify student internships, laboratory work and practical classes, which are only partially possible at a distance, as one of the biggest concerns. Although HEIs reported using virtual student testing applications, assessing student achievement, and ensuring fair learning remain a major challenge. This relates primarily to final thesis defenses, which HEIs identified as a separate important issue. Higher education institutions note that, in general, distance learning requires greater student discipline and motivation, as well as adherence to ethical standards. IoT is not only a part of education and that IoT tools can support both learners in problem-solving and educators in designing personalized, digitally driven learning, using interactive learning tools to improve understanding and mastery of the learning material, generate results and make assessment more effective. New threats to academic integrity have also emerged. According to tests carried out by lecturers and researchers, existing text matching tools do not currently recognize texts generated by the IoT, and emerging tools for recognizing information generated by the IoT do not work well and only recognize some of the texts generated by the IoT tools. The use of the IoT in everyday life, in scientific or work processes is only gaining momentum. The education system needs to find ways to integrate the IoT into the learning process and exploit its benefits.

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Packaging Properties for the Food Industry towards the Sustainable Packaging

Simona Grigaliūnienė

Klaipėda University, Lithuania Business College
Klaipėda, Lithuania

Modestas Jankūnas

Klaipėda University,
Klaipėda, Lithuania

Jolanta Janutėnienė

Klaipėda University,
Klaipėda, Lithuania

Abstract

The world's growing population, advancing urbanization and globalization have created a greater demand for food, which has increased demands on food safety and quality. The main function of food packaging is to prevent the entry of micro-organisms into the food and to protect it from environmental factors, thus keeping it fit for consumption. Today, polypropylene is one of the most common polymers used in the food packaging industry due to its good functionality and relatively low production costs. The aim of the research is to evaluate the possibility of replacing the multi-layered combined packaging made of polypropylene, aluminum and polyethylene terephthalate used in the food packaging industry with an alternative packaging consisting of only one polypropylene material. Also, to investigate the mechanical characteristics of these packages by tensile tests, and to determine the optimal sealing temperature of the polypropylene package to obtain relatively the highest strength and the smallest mean square deviation of the package. The research work involved studies on commercially available composite (PP, AL, PET) packaging to compare the tensile strength of this packaging with recyclable polypropylene packaging. This 200 μm thick composite packaging was found to have the highest tensile strength at a melt temperature of 200 °C of 71,85 N.

Keywords: polypropylene, mechanical properties, food packaging, tensile strength.

1. Introduction

The world's growing population, advancing urbanization and globalization have created a greater demand for food, which has increased demands on food safety and quality. The main function of food packaging is to prevent the entry of micro-organisms into the food and to protect it from environmental factors, thus keeping it fit for consumption. "The widespread use of plastics, with a global consumption of over 700 million tons per year, opens up new challenges for recyclers" (Fonseca-García, Jiménez-Regalado, Aguirre-Loredo, 2021). 65.4% of the world's packaging is plastic (Ellen Macarthur Foundation, 2023). These materials dominate the packaging industry due to their diversity and wide range of applications. A wide range of materials (plastics, metals, wood, etc.) are used worldwide to package products, but nowadays there is an increasing focus on polymeric materials, which are increasingly being used as packaging materials due to their beneficial properties, including excellent mechanical, thermal and environmental properties, as well as the ease with which they can be produced. However, conventional petroleum-based plastics are non-degradable, posing serious environmental problems. One alternative that contributes to the circular economy is the replacement of composite packaging by an alternative packaging made of only one polypropylene

material. The market is full of aluminum- and PET-coated polypropylene films, which are commonly used for food packaging. Recycling of this packaging is problematic because it is not made up of just one material. The simplest and most common recycling of such packaging is incineration, but this releases harmful alumina-based particulates. The EU Directive on Packaging and Packaging Waste requires EU countries to take measures through national programmed and other economic measures "to prevent the generation of packaging waste and to minimize the environmental impact of packaging" (Government of the Republic of Lithuania, 2018). The plastic under investigation, polypropylene, is more reliable than other plastics that can release toxic substances when heated. Polypropylene is popular due to its high melting point and good barrier properties, making it ideal for packaging products that need to be sterilized at high temperatures. Today, polypropylene is one of the most common polymers used in the food packaging industry due to its good functionality and relatively low production costs. Also, this fully correspond to the 12th Goal Responsible Consumption and Production, to reduce the ecological footprint by changing the way we produce and consume goods and resources (Sustainable Development Goals, 2015).

2. Analysis of Research Papers on Polypropylene for Packaging

According to Hisham A. Maddah, polypropylene was discovered in 1954 and has rapidly gained popularity worldwide [8]. This plastic is a long-standing polymer used in food packaging due to its low production costs and excellent mechanical properties, making it suitable to produce polymer films. Polypropylene has adequate transparency, relatively low density, and high strength, making it suitable for packaging applications (John R. Wagner Jr., 2009). A study by M.J. Balow found that polypropylene is one of the most important and widely used commodity thermoplastics, accounting for about 20% of the world's total plastics production for the food industry (Grand View Research, 2024).

Although the use of plastics in today's green agenda is debatable, statistics show that the global market for plastic packaging generated revenues of €375 billion in 2020. In 2020, the global plastic plastics market is estimated to reach USD 170 billion and by 2028 it is forecast to reach more than USD 486 billion. (Grand View Research, 2024). Studies conducted by Maier and Calafut as early as 1998 have shown that PP films are also safe for food contact.

Researchers around the world are working to find new applications for this plastic and to improve its existing mechanical and barrier properties, for example Goulart et al. in 2011 used palm fibers to enhance the mechanical properties of polypropylene. Cerqueira et al. 2011 described the mechanical properties of a polypropylene film using sugar cane fibres as reinforcement, and Arjaree 2014 carried out mechanical tests on a polypropylene film when the film was treated with calcium carbonate (CaCO₃) acid. Research to date predicts that polypropylene will continue to be widely used as a packaging material for decades to come, but new solutions are still being sought to improve the material's oxygen, water, and UV barrier properties. A study by Masaki Nakaya in 2015 found that PP film with a thickness of 30 - 60 µm has low water vapor and oxygen barrier properties (WVTR of about 2-4 g/m²/day, OTR of about 800-1700 cm³/m²/day). According to C.F. Struller, if the poor oxygen barrier of PP films can be solved by a simple method, it could become one of the main food packaging materials.

Currently, commercially available foodstuffs are often packaged in polypropylene film with an aluminum layer. The use of aluminum is considered as a standardized method to create a high oxygen barrier, but the transparency and recyclability of the coated films are lost. The only way to recycle such combined packaging is by incineration, but incineration of aluminum produces harmful alumina particulates. To find alternatives to aluminum, researchers have carried out studies using other barrier materials. Hoang-Linh Nguyen used a bio-renewable chitin-based nano-coating on polypropylene as a moisture barrier in 2021, Jeffrey d'Eon used cellulose nanocrystals in 2017 and Peng Lu in 2018. has used cellulose nanotubes, Onur Ozcalik conducted research on corn nanocomposite in 2013 and

Yixuan Song used polyelectrolyte multilayer nanocoating's in 2016. Daniel J. da Silva 2022 investigated and described an antimicrobial barrier layer of polypropylene films consisting of grape pomace extract, which is obtained as a waste product from wine production. This antimicrobial PP barrier layer has suitable properties to produce a flexible, biocompatible PP packaging that can prevent bacterial contamination and multiplication, which allows for safer storage of food products. Sasha Kaloper's 2024 study made significant progress in the field of PP films. He investigated and clarified the adhesion and stability properties of a coating of chitosan and plant extracts on PP films and demonstrated that such a barrier coating offers excellent UV protection for food products. In addition, as early as 2009, K. Rajakumar investigated that the UV barrier properties of PP films deteriorate over time. He also found that as PP film ages, the UV barrier properties also deteriorate, along with the film's tensile properties (strength). This research has led to major advances in nanotechnology for the development of material barrier coatings that protect against external influences. However, as further research has shown, the SiO_2 layer provides some of the best barrier properties. This barrier layer is not only used in the food industry, but also, as Daisuke Adachi reports in 2017, can be used to protect solar cells from environmental stresses. Yu-qiong Li in 2011 used this silicon oxide layer to provide electrical insulating properties to steel hinges.

As regards polypropylene films used in the food industry, M. Kihel (2014) found that the best gas barrier performance can be achieved using 6 μm thick SiO_2 coatings obtained by PECVD. According to Marius Baune, the SiO_2 coating seals small holes and gaps and forms a smooth, nearly impermeable layer. This layer thus provides a high barrier against gases, odours and water vapour [29]. In a study by N. Inagaki, it was found that the oxygen permeation rate through SiO_2 -deposited PP film decreased from 2230 to 37-52 $\text{cm}^3/\text{m}^2/\text{day}$, which is like that of polyvinylidene chloride (PVDC), which reaches 55 $\text{cm}^3/\text{m}^2/\text{day}$ at a film thickness of 11 μm (N. Inagaki, S. Tasaka, T. Nakajima, 2000). K. Tsuji (2015) found that treating PP film with oxygen plasma for 60 seconds resulted in a 15-fold decrease in oxygen transfer rate (OTR) compared to pure PP. According to M.S Hedenqvist, SiO_2 coating deposited on a polypropylene substrate can provide up to 90 times better oxygen barrier than pure polypropylene (M.S Hedenqvist, K.S Johansson, 2003). Despite these excellent barrier properties, the silica coating is flexible and does not pose any additional problems during recycling as the thickness of the coating is vanishingly small compared to the amount of polypropylene, so that the properties of the polypropylene are not compromised even if the mass is remelted.

Naturally, different researchers report different melting points for polypropylene in their studies. This is because the raw material from which the film is made varies, which results in certain impurities in the chemical composition. Production methods and equipment also vary, resulting in different densities of polypropylene. For example, Kaiser Wolfgang, in a 2011 study, reports that syndiotactic PP has a melting point of 171 $^{\circ}\text{C}$ (340 $^{\circ}\text{F}$), isotactic PP has a melting point between 160 and 166 $^{\circ}\text{C}$ (320 and 331 $^{\circ}\text{F}$), and PP becomes brittle at temperatures below 0 $^{\circ}\text{C}$. De Rosa (2006) indicates that the melting point range for syndiotactic PP is between 161 and 186 $^{\circ}\text{C}$, depending on the degree of tacticity. Yeliz Cetin in his 2017 study on polypropylene films found a melting point of 444 K (almost 171 $^{\circ}\text{C}$), Nello Pasquini in his 2022 study concluded that polypropylene melts between 163 $^{\circ}\text{C}$ and 167 $^{\circ}\text{C}$, Stefan Rettenberger in his 2022 study reported a melting range of 140 $^{\circ}\text{C}$ to 160 $^{\circ}\text{C}$ for polypropylene and investigated the change in the mechanical properties of polypropylene when stretched in this temperature range. Farrow refers to a melting point of 160 $^{\circ}\text{C}$ and W.L. Oliani to 170 $^{\circ}\text{C}$ [39]. It is important to note that T.K. Goswami and P.V. Mahajan proposed MAP packaging as early as 2009. MAP packaging stands for Modified Atmosphere Packaging. It is a technology used for the packaging of perishable foods such as fruits, vegetables, meat, poultry, seafood, and bakery products.

In MAP packaging, the air surrounding the product inside the packaging is changed or modified to extend its shelf life. This is usually achieved by changing the composition of the gases inside the

package, usually by reducing the oxygen content and sometimes by adjusting the content of other gases such as carbon dioxide and nitrogen. The modified atmosphere helps to slow down the deterioration of the product due to oxidation and microbial growth, thus preserving its freshness, taste, and nutritional quality for longer. MAP packaging is commonly used in the food industry to maintain product quality and extend shelf life without the use of additives or preservatives (S. Mangaraj, T. K. Goswami, P. V. Mahajan, 2009). These researchers have proposed the use of oxygen extraction from food packaging for the packaging of vegetables and fruits, but a study has shown that food packaged in such an environment in polypropylene film still becomes stale within three months, as oxygen from the environment penetrates the polypropylene film and damages this antimicrobial medium.

3. Methodology

Aim of the study is to investigate the seam strength of a two-layer (PP) food packaging at different melt temperatures and to compare the results with those of a three-layer packaging, with a subject of the study: three-layer (PP, AL, PET) and two-layer (PP) food packaging (Fig. 1).



Fig. 1 Comparison of combined (PP, AL, PET) and test (PP) food packaging (Toppan, 2023)

The tests were carried out in accordance with LST EN ISO 527-3, this standard describes the conditions under which tensile tests on plastic films and sheets are to be carried out. LST EN ISO 527-3 defines the basic conditions for tensile testing of plastic films thinner than 1mm, such as: specimen width 10-25mm, length ≥ 150 mm, grip spacing $100\text{mm} \pm 0.5\text{mm}$ (International Standard, 1995). In accordance with LST EN ISO 527-3, the specimens shall be manufactured at least 16 hours before use (to allow stress relaxation). Before the test, the cross-sectional dimensions of the working area of the specimens shall be measured in at least three places to an accuracy of 0.01mm. The results of three measurements of the cross-sectional dimensions of the test area of the test piece shall not differ by more than 0,2 mm. The test specimen shall be secured in the clamps of the tensile testing machine in such a way that it does not slip out of the clamps during the test and its longitudinal axis is exactly aligned with the axis of the tensile force. The speed of the machine gripping during the test shall be specified in the standards or in the technical specifications of the material (usually 100 mm/min). Tensile tests on plastics measure the deformation of the specimen. The accuracy of the measuring instruments shall be as follows: for a strain of 0.5mm to 10mm, the measurement error shall not exceed 0.1mm; for a strain of more than 10mm, the measurement error shall not exceed 1%.

Sample size: A total of 140 samples will be produced for the study, of which 125 samples were produced for a two-layer (PP) package with a seam fusion between 110°C and 190°C and 15 samples will be produced for a three-layer (PP, AL, PET) package with a seam fusion between 140°C and 240°C . The investigation was divided into main parts:

Part I - the current combination packaging used in production, consisting of polypropylene, aluminum, and polyethylene terephthalate. The seam fusion temperature of this packaging is

specified by the manufacturer as $200^{\circ}\text{C} \pm 10^{\circ}\text{C}$. 5 specimens were produced with a fused seam temperature of 140°C , 5 specimens with a fused seam temperature of 200°C and 5 specimens with a fused seam temperature of 240°C . The aim of this study is to determine the strength properties of the current packaging and to compare the results with polypropylene packaging.

Part II - Determination of the melting temperature range of polypropylene packaging. As this is the first time that such a study has been carried out with the packaging and equipment concerned, it is not clear over what temperature range of the melting hammer of the melting machine the packaging under investigation is likely to melt, but it is known that the melting point of polypropylene is around 160°C . Consequently, 5 specimens are being produced, each of which are melted at $110, 130, 150, 160, 170, 180, 190^{\circ}\text{C}$ respectively.

Part III - Once the melting temperature range of the package has been determined, the test continues in this temperature range, but with 10 samples being produced and tested and the temperature variation of the samples reduced to 5°C . A total of 90 samples were produced and melted at $140, 145, 150, 155, 160, 165, 170, 175, 180^{\circ}\text{C}$ respectively.

Variables to be investigated: The main variable in the study, which determines the leak tightness (sterility) of the food packaging, is the temperature of the fused seam. The three layers (PP, AL, PET) have a higher fusion temperature because aluminum is a good thermal conductor and therefore heat is distributed over a larger area of the package. In double-layer (PP) packaging, the main material is polypropylene, which has a melting point of only about 160°C .

Study design: Seal the packaging. Two-layer (PP) packaging and three-layer (PP, AL, PET) packaging are used with seams fused at different temperatures. The strips are cut from the produced bags with uniform dimensions (width 20 mm is chosen). All strips are cut from the same place on the sample (chosen to be cut in the middle, Figure 2). After the specimens have been made, allow at least 16 hours for the seams to cool and for the stresses to disappear. The specimens shall be clamped in the clamps of the Zwick Roell Z100 tensile testing machine (Figure 3) and tensile tests shall be carried out. Afterwards determined the relationship between the mechanical characteristics of the package and the fusion temperature of the seam.



Fig. 2 Shape of specimen to be used

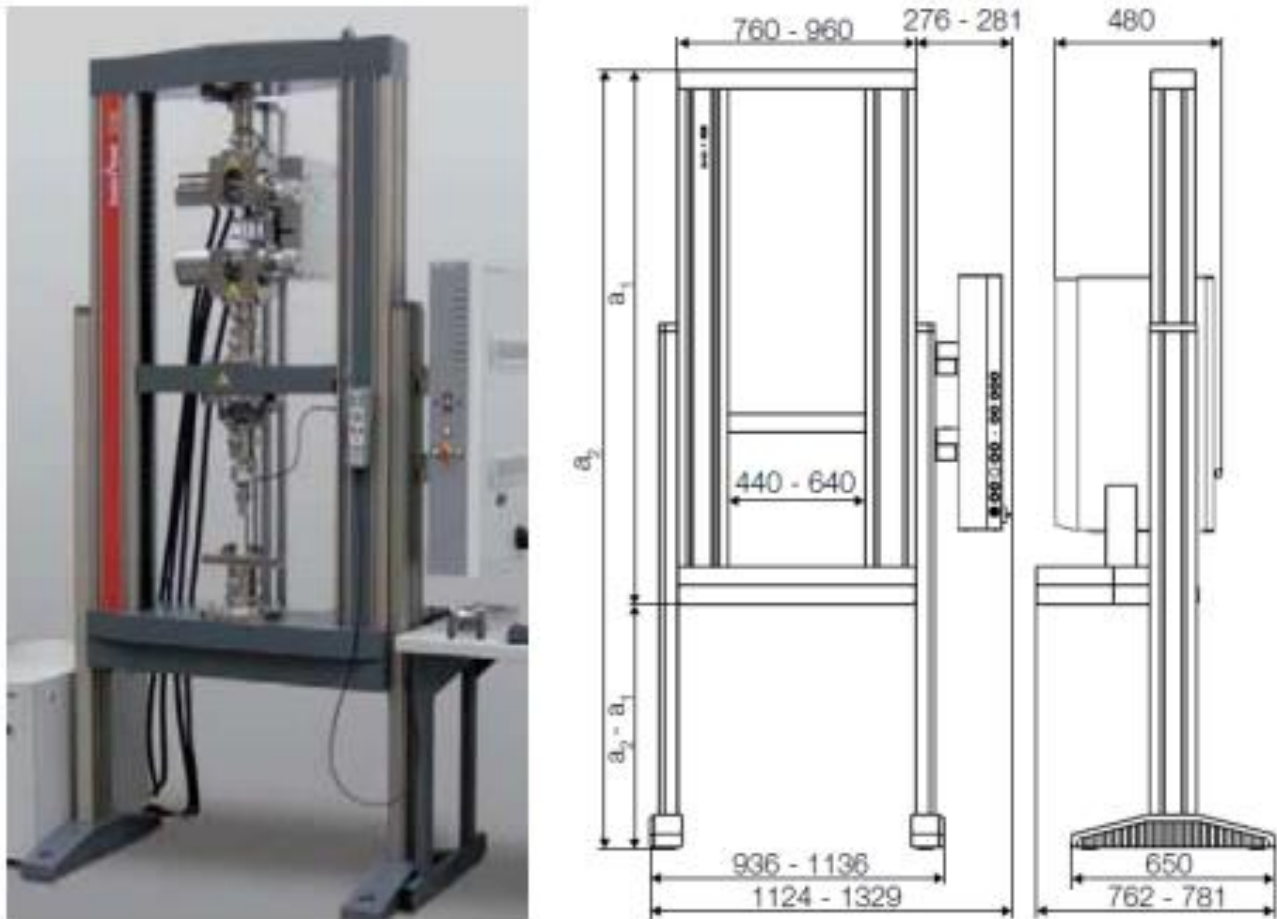


Fig. 3 Zwick/Roell Z100 tensile-compression machine (Yumpu, 2024)

The research work first required the production of a total of 50 packaging samples, of which 35 were made from two-layer polypropylene (PP) film and the remaining 15 from a combined (PP, AL, PET) film. The samples were produced on a specially adapted certified bag making machine from Japan, Nishibe SBM-600-SP, and the top seam was sealed with a bag filling and sealing machine Pacraft TT-9 CWS. "In the Pacraft TT-9 CWS, the food packaging is melted with heating hammers, which are heated with a heating pad and a thermocouple is used to measure the temperature. The temperature on the surface of the heated hammer is set between 40°C and 400°C with an accuracy of $\pm 0,25^\circ\text{C}$

4. Results and Discussion

In order to compare the mechanical performance of polypropylene (PP) films, the mechanical performance of a combination film (PP, AL, PET), which is currently widely used in the food industry, was investigated. As this combined film is already in use on the market, many manufacturers of packaging/molding equipment specify the required melt temperatures and other variables in the specifications of their equipment. "Pacraft TT-9 CWS, a Japanese manufacturer, specifies that the optimum temperature for 200 μm combined (PP, AL, PET) film is $200^\circ\text{C} \pm 10^\circ\text{C}$; the clamping time of the fusing hammers is 1,2 s for a fusing seam width of 8 mm and a fusing seam length of 75 mm. At a seam fusion temperature of 155 $^\circ\text{C}$, the specimens show the onset of a local cross-sectional reduction, the neck (Figure 4, point O1). The tensile force $F_{\{\max\}}$ is 60,19 N; the root mean square deviation is 3,66 N; the variation is 6,09 N (Table 1).

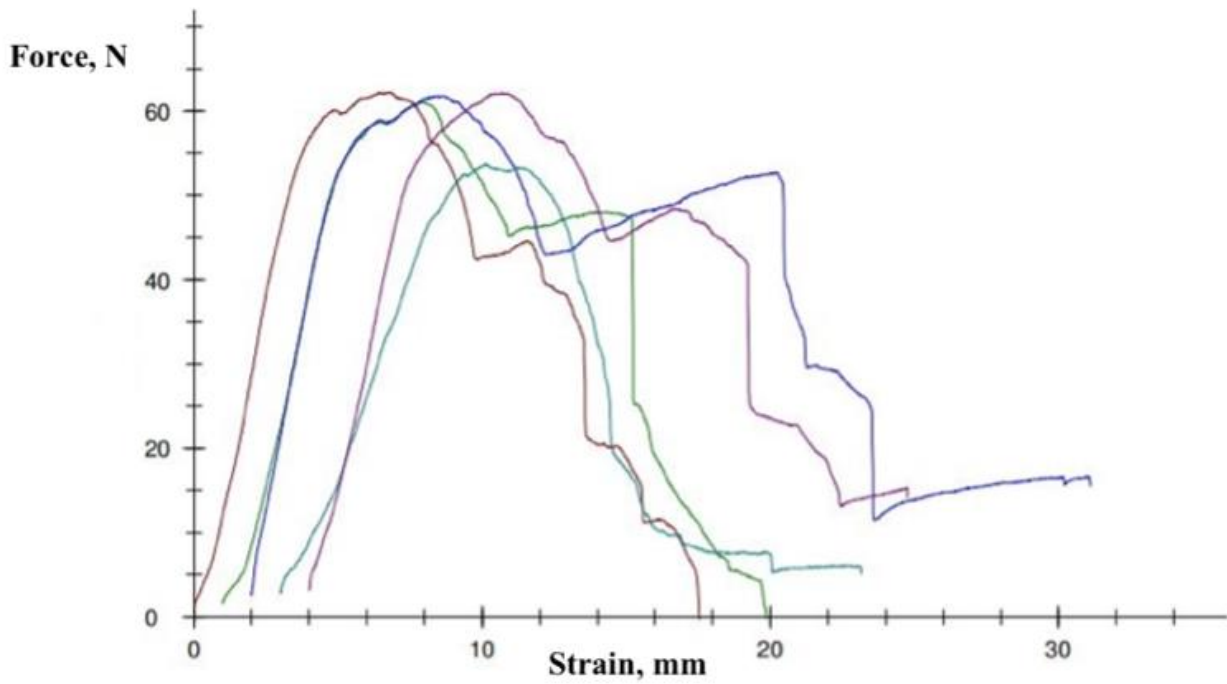


Fig. 4 Force strain diagram characteristics of a composite (PP, AL, PET) film packaging at a melt temperature of 155 °C

At a seam fusion temperature of 200 °C, the specimens show the formation of a local reduction in cross-section, the neck, as the yield strength is reached (Figure 5, point O1). The tensile force F_{\max} is 71,85 N; the root mean square deviation is 2,47 N; the variation is 3,44 N (Table 1).

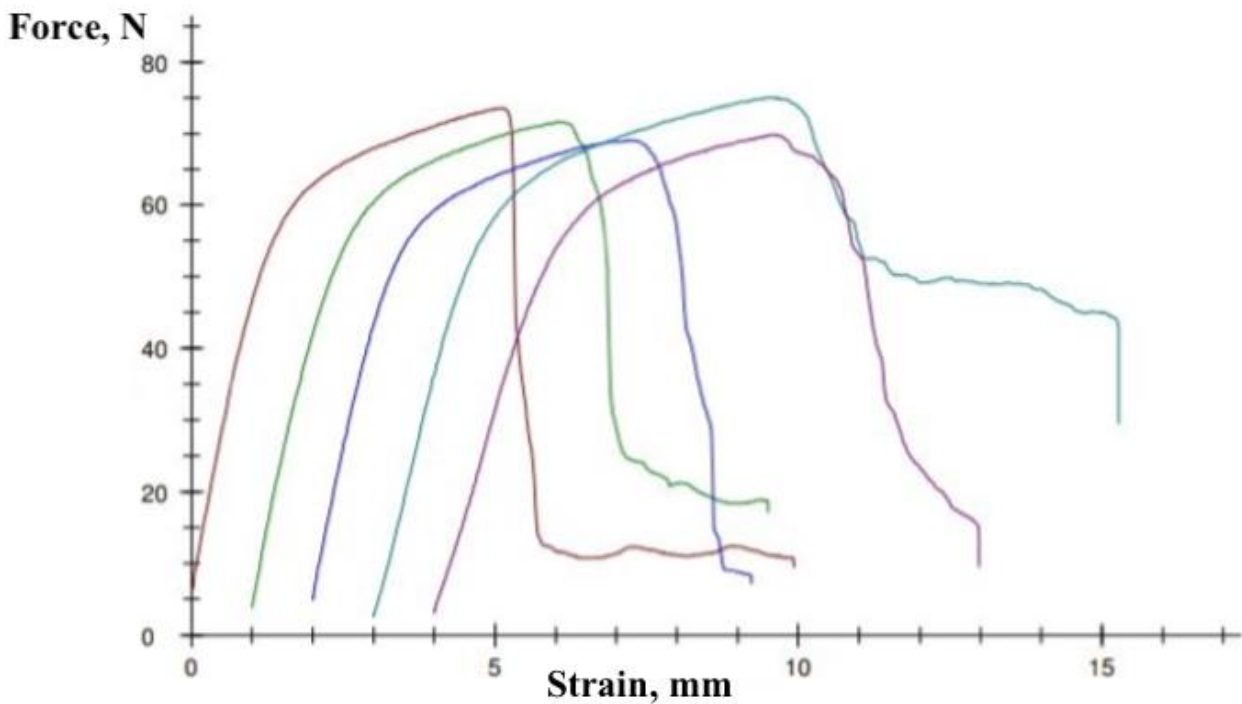


Fig. 5 Force strain diagram characteristics composite (PP, AL, PET) film packaging at a melt temperature of 200 °C

At a seam fusion temperature of 240 °C, the specimens show a gradual further deformation (elongation) after the yield strength is reached, before finally breaking. The tensile force F_{\max} is 70,06 N; the root mean square deviation is 4,68 N; the variation is 6,68 N. As there is currently no two-layer polypropylene film packaging used in the food industry on the market with a shape, size, thickness, composition, or function matching the dimensions of the packaging to be tested, it is important to first determine the melting temperature range of the packaging. The tests were started at a melting hammer temperature of 110°C; the melting hammer compression time was 1,2 s; the melting hammer compression pressure was 4 bar. At 110°C, the seam did not melt at the temperature of the melting hammers. The temperature was further increased to 130°C but the seam did not melt. A further test was carried out at a melting temperature of 150 °C, the specimens show the onset of a local cross-sectional reduction, the neck. The tensile force F_{\max} is 83,77 N; the root mean square deviation is 5,63 N; the variation is 6,72 N. The seam temperature was increased continuously until finally, at a hammer temperature of 190°C, the seam did not visually meet the quality requirements (overheated/melted).

Table 1 Summary results of Part I and Part II of the investigation

Packaging material	Melting temperature	Number of tests	Tensile force, N	Root mean square deviation, N	Variation, N
Combined (PP, AL, PET)	155 °C	5	60,19	3,66	6,09
Combined (PP, AL, PET)	200 °C	5	71,85	2,47	3,44
Combined (PP, AL, PET)	240 °C	5	70,06	4,68	6,68
Double-layer polypropylene (PP)	150 °C	5	83,77	5,63	6,72
Double-layer polypropylene (PP)	160 °C	5	73,68	11,06	15,02
Double-layer polypropylene (PP)	170 °C	5	102,99	15,19	14,75

Tensile tests have shown that the melting temperature range of the two-layer polypropylene film package, where the fused seam is visually satisfactory, is between 140 °C and 180 °C. The tensile strength of food packaging currently used in the industry is almost 72 N (at 200 °C). Increasing the temperature of the melt seam hammers by 40 °C (to 240 °C) resulted in a decrease of only 2,5 % in the tensile force to 70,06 N. The RMS deviation value increased accordingly from 2,47 N to 4,68 N, which reflects the greater spread of the data around the mean. Lowering the fusion temperature of the seam of the combined package to 155 °C results in a tensile strength of 60,19 N and a root mean square deviation of 3,66 N. Thus, the characteristics of the combined package show that, under the intended conditions, the optimum fusion temperature of the seam is 200 °C.

Comparison of the two-layer polypropylene 140 µm package with the combined 200 µm package shows that the polypropylene package has a better mechanical tensile strength at 170 °C, with a tensile strength of 103 N, but at this temperature the root mean squared deviation of the seam strength is 15.19 N, which indicates a high variability and scatter around the mean. Once the seam temperature range of the polypropylene film was determined, further tests were carried out in this temperature range. In order to obtain more accurate results and to reduce the error, the tests were carried out on 10 specimens with different melt temperatures. The tests were started at a seam fusion temperature of 140°C, with a temperature change step of 5°C (Table 2).

Table 2 Summary results of Part III of the investigation

Test no.	Melting temperature	Number of tests	Tensile force, N	Root mean square deviation, N	Variation, N
1	140 °C	10	71,7	7,6	10,6
2	145 °C	10	79,38	8,7	10,96
3	150 °C	10	78,79	7,31	9,27
4	155 °C	10	83,84	6,63	7,9
5	160 °C	10	92,06	9,24	10,04
6	165 °C	10	82,32	5,79	7,03
7	170 °C	10	73,46	8,85	12,05

Continued testing at 175°C resulted in visual changes and charring of the seam and the tests were discontinued, after it was concluded that the maximum permissible seam melt temperature of the polypropylene film under the conditions described in the test is 170°C. Tensile strength is increasing accordingly till the 160°C and starts decreasing further increasing the melting temperature.

5. Conclusions

Improving the efficiency of packaging materials can help prevent foodborne pathogens and reduce environmental waste. In many cases, food is packaged in plastics that are difficult to recycle and have a negative impact on the environment. Sustainable packaging materials play an important role in maintaining good ecosystem health. However, the use of sustainable materials is limited due to their inferior barrier and mechanical properties, which lead to a shorter shelf life of food compared to conventional food packaging materials. The research work involved studies on commercially available composite (PP, AL, PET) packaging to compare the tensile strength of this packaging with recyclable polypropylene packaging. This 200 µm thick composite packaging was found to have the highest tensile force at a melt temperature of 200 °C of 71,85 N. Correspondingly, at this temperature, the RMS deviation of the samples is 2,47 N and the variation is 3,44 N. In the course of the work under investigation, tests were carried out on recyclable polypropylene packaging. The tensile force of this 140 µm thick packaging was found to be highest at a melt temperature of 160 °C, with a value of 92,06 N. The root mean square deviation of the samples at this temperature was found to be 9,24 N and the variation 10,04 N. Comparison of the tensile performance of the combined (PP, AL, PET) packaging with that of the polypropylene (PP) packaging shows that the polypropylene packaging is 28,13 % stronger than the combined (PP, AL, PET) packaging, but with a higher root mean squared deviation and higher variation. Nevertheless, the polypropylene film confirmed the hypothesis of the research that its tensile strength would not be less than 50 N. This packaging can contribute to the Green Deal as it is recyclable. Polypropylene packaging has a lower melt temperature and is thinner than composite packaging, which would also reduce production costs. Further research is needed to determine the UV, gas, and water barrier properties of this packaging for use in the food industry.

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Fintech in the COVID-19 Epoch: The Adoption and Future of Contactless Payment Technology of a Cashless Society

Bhavish Jugurnath, Navima Jhurry and Rajendra Parsad Gunpath

Faculty of Law and Management

University of Mauritius

Reduit, Mauritius

Abstract

This study aims to investigate the role of Fintech during the COVID-19 outbreak in the prediction of the adoption of contactless payment technology. The study adopted a quantitative research methodology to scrutinise the data collected and a questionnaire-based survey was administered to people around the world through social media platforms like LinkedIn and Facebook and 274 responses were collected. For the analysis, the proposed model's reliability was verified using confirmatory factor analysis (CFA) whereby the ten study constructs were tested individually, and it was followed by structural equation modelling (SEM). The findings showed that the benefits of using contactless payment technology influencing UTAUT's performance expectancy are availability, variety and economy. Factors influencing effort expectancy of UTAUT are security, availability and economy. Therefore, it shows that performance expectancy and effort expectancy for technology acceptance varies with different technology benefits. As for the factors of the UTAUT model, 3 of them which are performance expectancy, social influence and facilitating conditions are positively significant with the adoption of the technology amidst the COVID-19 pandemic. In terms of the use of contactless payment technology during COVID-19, this study presents a new paradigm.

Keywords: Covid-19, Fintech, contactless payment technology, confirmatory factor analysis, structural equation modelling.

1. Introduction

In this contemporary epoch, technology has escalated its tentacles in multifarious industries which led to the emergence of Fintech. A number of trends as a result of the novel virus are starting to emerge that will alter the banking and finance landscape. The pandemic has drastically hastened up the global breakthrough towards a cashless society. The COVID-19 pandemic is the "infectious disease caused by the most recently discovered coronavirus. The new virus and disease were unknown before the outbreak began in Wuhan, China, in December 2019" (WHO, 2020b). The World Health Organization (WHO) marked COVID-19 as a pandemic on March 11th, 2020. Because the tendencies of the virus are still not completely predicted, it is exacerbating fear and panic throughout the world. The fear of Covid-19 infection is therefore a catalyst for contactless payment technology usage. It is rational to think of COVID-19 risk perception as "the push factor" that drives contactless payment technology acceptance and usage. Previous literatures have confirmed a relationship between health anxiety and fear emotion with the use of health-related technologies. According to Al-Marouf et al., (2020) research 's there is a substantial relationship between the fear emotion and Google Meet adoption during the pandemic. Additionally, Wnuk et al. (2020) discovered that an adoption of COVID-19 tracking technologies was significantly predicted by the users' perceived personal threat and lack of personal control.

2. Literature review

Definition of contactless payment technology

Contactless payment technology is one of the eminent fintech advancements (Cag, 2021). A contactless chip found in mobile phones, tags, key fobs, and payment cards allows for payment transactions. When a reading device employs radio frequency (RF) or Near Field Communication (NFC) standards, the chip can communicate with it. As a component of the machine-to-machine communications trend, it includes radio frequency identification (RFID). The terms "wave and pay" and "tap and go" are more commonly used to describe contactless payments (Gartner, 2020).

2.1 Overview

The world has been gripped by the ongoing global pandemic since its outbreak in the Chinese city of Wuhan in December 2019. The novel virus has flung the world into uncertainty and the fear of COVID-19's dreadful transmission into humans makes people refrain from touching surfaces because of potential contamination and they are cautious and committed to hygienic sanitary measures to avoid the probability of being infected from contaminated surfaces. People are advised to wash their hands after handling banknotes and to avoid touching their face as the banknotes could be a way to spread the virus. On the contrary, virologists were contemptuous with idea that cash could spread the virus among humans, they take a firm stand that the disease spread via airborne water droplets (Clark, 2020). Consumers are also shifting their payment behaviour towards cashless methods by reason of procedures such that in countries like China and South Korea, they quarantine cash for 7-14 days exposing it to routine heat and ultra-violet light (Cocheo, 2020). In addition, thousands of banknotes have been disinfected and even destroyed in China to reduce the spread of the virus. In the US, the federal reserve has a procedure of storing banknotes that came from Asia before recirculation into the economy (Saigal, 2020).

2.2 Benefits of using contactless payment technology

Security: Contactless payment technologies were established by Mastercard with the idea that convenience should never come at the expense of security. These cards and devices have an integrated chip and radio frequency (RFID) antenna that create a wireless link with the contactless reader so that information is transferred in a highly secure manner in a split second when the cards or devices are tapped against the reader (Ryan Erenhouse, 2018). All transactions executed are tokenized with a one-time transaction number (Tech Target Contributor, 2021). Moreover, there are several additional built-in security measures which can also be further strengthened by use of biometric (Visa Consulting & Analytics, 2020). Furthermore, if a data transmitted is intercepted, an attacker will only be able to access the one-time code that was used to identify specific transactions.

Availability: It refers to the degree of which users are able to use contactless payment technologies with stable service functions. As a matter of fact, the average time it takes for contactless payments is just 0.5 seconds (AppFrontier, 2020). During the pandemic situation, contactless payment technologies can provide a much safer and viable alternative to 'cash-heavy' merchants.

Credibility: It refers to the degree to which users believe that data in the contactless payment technologies is transparent and pertains high integrity. Contactless payments combine security and data integrity, allowing transactions to complete in a matter of a few seconds. These payments enable customers to complete their transactions faster and safer and provide financial institutions the opportunity to process more transactions in a shorter time period (AppFrontier, 2020).

Variety: It can be referred to the extent to which users believe that contactless payment technologies are likely to be used in different spheres of the financial areas. The variety of contactless payment options provided by the financial sector, including credit cards, debit cards, smart cards, key fobs, and gadgets that use near-field communication (NFC) or radio frequency identification (RFID), such

as Samsung Pay, Apple Pay, Google Pay, Fitbit Pay, or any mobile bank application that supports contactless, aids in making secure transaction payments (Wikipedia, 2022).

Economy: Economy is in terms of the degree to which users are expected to gain benefits economically such as cost saving benefits by using contactless payment technologies. Contactless payment technologies are able to reduce the hidden cash management costs such as storage, production and logistic related costs (YAKEAN, 2020). Moreover, to ease foreign payments and stock exchanges, financial institutions can adopt contactless payment technologies as international transfers can be expensive and may take up to several days especially with the covid-19 situation with slower management and logistics.

2.3 Challenges of using digital payment technology

Online Fraud: The pandemic outbreak has created a scenario of insecurity that it is an opportunity for fraudsters to exploit the crisis situation by extracting money, accessing confidential information or by creating vulnerabilities (Agarwal, 2017).

Privacy: Privacy has been recognized as a substantial and recurring risk in studies on mobile payments (Johnson et al., 2018), location-based mobile services and social networking sites (Zhou, 2012). It would be helpful to consider the various privacy concerns of users when adopting both Covid-19 tracking programs and online classroom applications.

3. Research methodology

For the purpose of this study, data was collected from two sources. Primary data, which were collected through a questionnaire-based survey administered to different countries worldwide using Snowball Sampling Method (SSM). The study used ten constructs and were tested through a pilot study to detect any discrepancies with 10 selected persons. A 5-point Likert scales in the form of 1=strongly disagree, 2=disagree, 3=Neutral, 4=Neutral and 5=Agree were applied to all the constructs. Secondary data, which were collected from available internet materials, reports and journal articles. A sample size of 274 people was selected using the rules of thumb, implying that “Sample sizes greater than 30 and less than 500 are suitable for most studies” Cochran (1963).

3.1 Research model and hypotheses

The purpose of this study is to investigate the adoption of contactless payment technology during COVID-19. The UTAUT model have been adopted by incorporating it as shown in Figure 1.

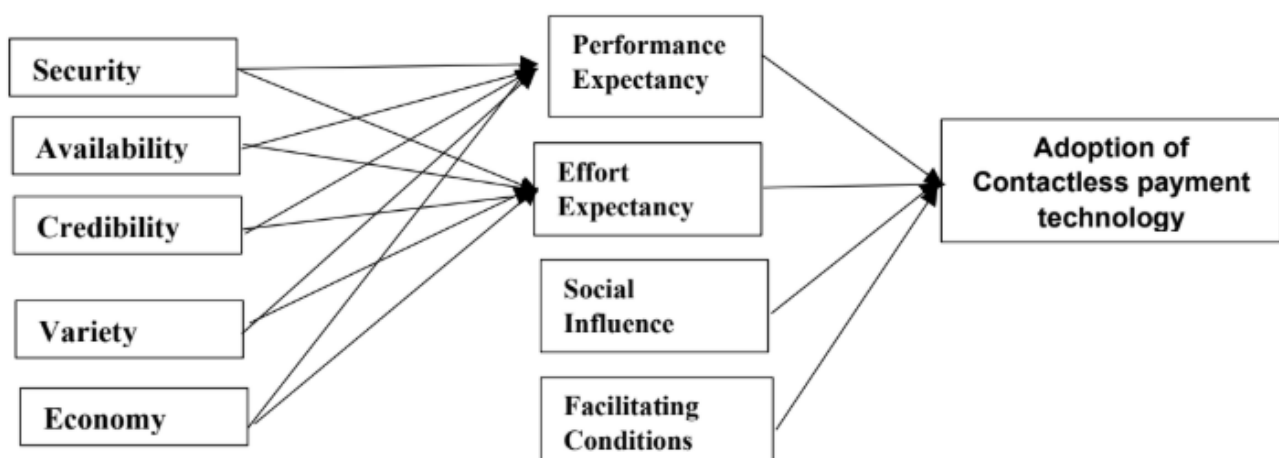


Figure 1: Research Model

3.2 Testing of Assumptions

Prior to performing a thorough statistical analysis, Kline (2016) prescribed some tests that can be conducted to check some basic hypotheses. These tests consist of; tests for normality of the sample data, linearity between the different variables and tests for multicollinearity and homoscedasticity.

Assessment of normality of sample data

A variable with a skewness value of 3 or less and a kurtosis value of less or equal to 8, follow a normal distribution. And as per Byrne (2016), distribution that deviates from normality is one in where the critical ratios are greater than 5. It was observed that there was no significant deviation from normality in the sample data and thus, the use of Structural equation modelling can be affirmed.

Linearity of Relationships

A curve-linear regression was performed on each of the relationships to be tested using SEM, in order to check that they are sufficiently linear. It was observed that the relationships between all the variables were adequately linear ($p=0.000<0.005$) and thus all the relationships can be included in the SEM model.

Multicollinearity

The Variance Inflation Factor (VIF) and tolerance levels can be used to determine the presence of multicollinearity (Adeboye et al., 2014). Menard (1995) and Hair et al. (1995) noted that tolerance values which are less than 0.1 with corresponding VIF values which are greater than 10 shows the presence of multicollinearity. It was noted that all the values of tolerance and VIF were within the recommended thresholds. The values of tolerance had an upper bound of 0.797 and a lower bound of 0.116, while the values of VIF were below the recommended threshold of 10 where the maximum value was 8.866. Hence, multicollinearity was not present between the independent variables.

4. Measurement Model

As proposed by Anderson et al. (1988) and Awang (2015), the Confirmatory factor analysis (CFA) approach was adopted to test the validity and reliability of the measurement model followed by the structural equation modelling (SEM) to evaluate the study hypothesis using AMOS V23 software. To ensure the measurement of this study; convergent validity, discriminant validity and reliability of the constructs were evaluated.

Convergent validity: It was tested by examining the average variance extracted (AVE) and indicator loadings. As shown in Table 1, the AVE values for each of the constructs was examined and were found to be larger than 0.5 and hence the constructs possessed a good convergent validity.

Table 1: Convergent Validity

Indicators	Average Variance Extracted (AVE)
Security	0.780
Availability	0.664
Credibility	0.791
Variety	0.882
Economy	0.511
Performance Expectancy	0.653
Effort Expectancy	0.539
Social Influence	0.730
Facilitating Conditions	0.655
Adoption of Cashless Payment technology	0.582

Discriminant validity: It exists when the value of AVE should be greater than the inter-construct correlations (Henseler et. al, 2014). By comparing the inter-construct correlations with the square root of the AVE, the correlations were smaller than the square root of the AVE as seen in table 2 below. This is an indication that the predictor variables had more shared common variance with the variables that they predict, when compared to the other variables in the model. Thus, it was noted that the variables possessed discriminant validity.

Table 2: Discriminant validity

	S	A	C	V	E	PE	EE	SI	FC	ADP
S	0.883									
A	0.324	0.815								
C	0.151	0.636	0.889							
V	0.436	0.719	0.675	0.939						
E	0.236	0.056	0.259	0.153	0.715					
PE	0.365	0.235	0.263	0.235	0.259	0.808				
EE	0.256	0.422	0.145	0.425	0.124	0.265	0.734			
SI	0.672	0.364	0.025	0.080	0.244	0.361	0.012	0.854		
FC	0.458	0.148	0.348	0.356	0.846	0.211	0.033	0.051	0.809	
ADP	0.124	0.612	0.210	0.389	0.302	0.132	0.055	0.043	0.042	0.763

*Diagonal values are the square root of the AVE and presented off-diagonal are inter-construct correlations

Reliability of construct: Construct reliability was tested by calculating composite reliability scores. It was noted that the lowest value of Cronbach's alpha was 0.795 (Variety), while the highest value was 0.933 (Social Influence). The variables were deemed as adequately reliable as the values of alpha were larger than 0.7. As far as composite reliability is concerned, the values ranged between 0.991 and 0.723, which were well above 0.7 satisfying the recommended threshold.

Table 3: Reliability

Indicators	Cronbach's Alpha (α)	Composite Reliability (CR)
Security	0.918	0.991
Availability	0.887	0.723
Credibility	0.903	0.891
Variety	0.795	0.738
Economy	0.868	0.910
Performance Expectancy	0.897	0.981
Effort Expectancy	0.830	0.842
Social Influence	0.933	0.744
Facilitating Conditions	0.880	0.822
Adoption of Cashless Payment technology	0.834	0.731

4.1 Assessment of model fit for overall measurement model

Table 4: Model fit of the structural model

Model fit of the structural model				
CMIN/DF	CFI	TLI	IFI	RMSEA
2.992	0.760	0.747	0.761	0.088

CFI - Comparative Fit Index; TLI - Tucker Lewis Index; IFI - Incremental Fit Index; RMSEA - Root Mean Square Error of Approximation

As observed in Table 4, the value of χ^2/df (2.992) is below the threshold of 5 as prescribed by Schumacker and Lomax (2004). The CFI value of 0.760 can be deemed as an acceptable fit as a value larger or equal to 0.85 shows progress. (Bollen, 1989). The value of RMSEA of 0.088 was also sought as acceptable as both Browne and Cudeck (1993). This demonstrated a good fit between the model and the data for the further structural model analysis.

4.2 Hypothesis testing of SEM Model

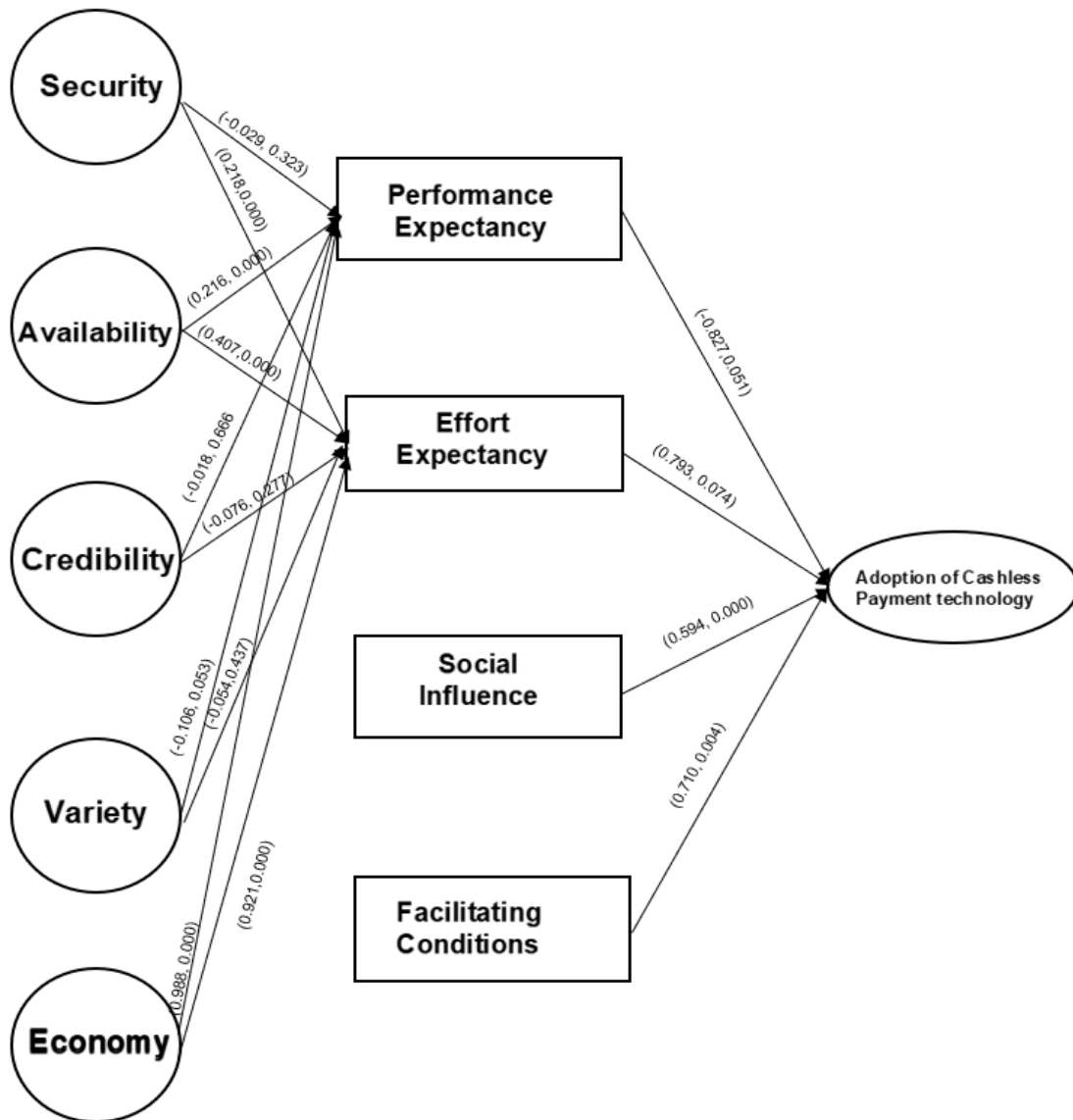


Figure 2: Hypothesis testing of SEM Model

Table 5: Hypothesis testing of SEM Model

Relationship	Estimate	Sig.(p)	
Performance Expectancy <---Security	-0.029	0.323	Not Supported
Performance Expectancy <---Availability	0.216	(0.000)***	Supported
Performance Expectancy <---Credibility	-0.018	0.666	Not Supported
Performance Expectancy <---Variety	-0.106	(0.053)*	Supported
Performance Expectancy <---Economy	0.988	(0.000)***	Supported
Effort Expectancy<---Security	0.218	(0.000)***	Supported
Effort Expectancy<---Availability	0.407	(0.000)***	Supported
Effort Expectancy<---Credibility	-0.076	0.277	Not Supported
Effort Expectancy<---Variety	-0.054	0.437	Not Supported
Effort Expectancy<---Economy	0.921	(0.000)***	Supported
Performance Expectancy<--- Adoption	-0.827	(0.051)*	Supported
Effort Expectancy<--- Adoption	0.793	0.074	Not Supported
Social Influence<--- Adoption	0.594	(0.000)***	Supported
Facilitating Conditions<--- Adoption	0.710	(0.004)***	Supported

***1 % level of significance | ** 5% level of significance | * 10% level of significance

Out the 14 relationships, 9 were statistically significant. Consequently, the following hypotheses were tested for significance.

Hypothesis 1 (H1): There is a direct positive relationship between security of cashless payment technology and user’s performance expectancy

The relationship between security of cashless payment technology and user’s performance expectancy is statistically insignificant even at 10% level of significance, given the p-value of 0.323 and a coefficient of -0.029. This shows that security does not have a significant importance in a user’s performance expectancy and hence H1 is rejected. The results are in contrast with the study of (Ryan Erenhouse, 2018), as the author showed that with built-in security features, contactless payment technologies can communicate information in a highly secure manner in just a few microseconds.

Hypothesis 2 (H2): There is a direct positive relationship between availability of cashless payment technology and user’s performance expectancy.

The relationship between availability of cashless payment technology and performance expectancy is statistically significant at 1% level of significance with a coefficient of 0.216. This shows that availability have a positive direct relationship with user’s performance expectancy and hence H2 is accepted. The results show that the more contactless payment technology is made available to users the more users will be motivated to use it, which aligns to the study of Visa consulting & Analytics (2020).

Hypothesis 3 (H3): There is a direct positive relationship between credibility of cashless payment technology and user's performance expectancy

The relationship between credibility of cashless payment technology and user's performance expectancy is statistically insignificant even at 10% level of significance, given the p-value of 0.666 and a coefficient of -0.018. This shows that credibility does not have a positive direct relationship with user's performance expectancy and hence H3 is rejected.

Hypothesis 4 (H4): There is a direct positive relationship between variety of cashless payment technology and user's performance expectancy

The relationship between variety of cashless payment technology and performance expectancy is statistically significant at 10 % level of significance with a coefficient of 0.106. This shows that variety have a positive direct relationship with user's performance expectancy and hence H4 is accepted. The results align as indicated by (Thompson et al., 1991).

Hypothesis 5 (H5): There is a direct positive relationship between economy of cashless payment technology and user's performance expectancy.

The relationship between economy of cashless payment technology and performance expectancy is statistically significant at 1 % level of significance with a coefficient of 0.988. This shows that economy have a positive direct relationship with user's performance expectancy and hence H5 is accepted. As indicated by (YAKEAN, 2020), that cashless payment technology has cost saving benefits.

Hypothesis 6 (H6): There is a direct positive relationship between security of cashless payment technology and user's effort expectancy

The relationship between security of cashless payment technology and effort expectancy is statistically significant at 1 % level of significance with a coefficient of 0.218. This shows that security have a positive direct relationship with user's effort expectancy and hence H6 is accepted. The results go in line with the study of (Ryan Erenhouse, 2018), the cashless payment technology is safe to use.

Hypothesis 7(H7): There is a direct positive relationship between availability of cashless payment technology and user's effort expectancy

The relationship between availability of cashless payment technology and effort expectancy is statistically significant at 1 % level of significance with a coefficient of 0.407. This shows that availability have a positive direct relationship with user's effort expectancy and hence H7 is accepted. This means that the more availability of the technology the more the ease of use, as indicated by (Rogers, 1995).

Hypothesis 8 (H8): There is a direct positive relationship between credibility of cashless payment technology and user's effort expectancy

The relationship between credibility of cashless payment technology and effort expectancy is statistically insignificant even at 10 % level of significance with a coefficient of -0.076. This shows that credibility does not have a positive direct relationship with user's effort expectancy and hence H8 is rejected. The results are in contrast with Plouffe et al. (2001) and Thompson et al. (1991) who assured the likenesses between these concepts.

Hypothesis 9 (H9): There is a direct positive relationship between variety of cashless payment technology and user's effort expectancy.

The relationship between variety of cashless payment technology and effort expectancy is statistically insignificant even at 10 % level of significance with a coefficient of -0.054. This shows that variety does not have a positive direct relationship with user's effort expectancy and hence H9 is rejected.

Hypothesis 10 (H10): There is a direct positive relationship between economy of cashless payment technology and user's effort expectancy

The relationship between economy of cashless payment technology and effort expectancy is statistically significant at 1 % level of significance with a coefficient of 0.921. This shows that economy have a positive direct relationship with user's effort expectancy and hence H10 is accepted. The results align with the study of (Rogers, 1995).

Hypothesis 11 (H11): Performance expectancy will have a positive effect on users' adoption of cashless payment technology.

The relationship between performance expectancy and users' adoption of cashless payment technology is statistically significant at 10 % level of significance with a coefficient of -0.827. This shows that performance expectancy has a positive direct relationship with user's adoption of cashless technology and hence H11 is accepted.

Hypothesis 12 (H12): Effort expectancy will have a positive effect on users' adoption of cashless technology.

The relationship between effort expectancy and users' adoption of cashless payment technology is statistically insignificant even at 10 % level of significance with a coefficient of 0.793. This shows that effort expectancy has a positive direct relationship with user's adoption of cashless technology and hence H12 is rejected.

Hypothesis 13 (H13): Social influence will have a positive effect on users' adoption of cashless technology.

The relationship between Social influence and users' adoption of cashless payment technology is statistically significant at 1 % level of significance with a coefficient of -0.594. This shows that Social influence have a positive direct relationship with user's adoption of cashless technology and hence H13 is accepted.

Hypothesis 14 (H14): The facilitating condition will have a positive effect on users' adoption of cashless technology.

The relationship between facilitating condition and users' adoption of cashless payment technology is statistically significant at 1 % level of significance with a coefficient of 0.710. This shows that facilitating condition have a positive direct relationship with user's adoption of cashless technology and hence H14 is accepted.

5. Conclusion

The study findings showed that the variables availability, variety and economy have a positive significant relationship with performance expectancy while security and credibility have an inverse relationship. Security, availability and economy have a positive significant relationship whereas credibility have an insignificant relationship. The results represent the factors influence the adoption of the contactless payment technology. As for the factors of the UTAUT model, 3 of them which are performance expectancy, social influence and facilitating conditions are positively significant with the adoption of the technology amidst the COVID-19 pandemic. The study's findings deduced that people have a specific perception towards physical money, cards, and payment terminals that these payment methods are determinants contributing to the adoption of contactless payment technology

Limitations

The primary barrier to this study was the lack of literature directly connecting the COVID-19 outbreak and the use of contactless payment technologies. In addition, due to time constraint the study was conducted with a sample size of 274 which represents less than 1% of the targeted population besides that, the questionnaire was administered online which if it was done through face-to-face interviews, better information might be collected.

Recommendations for future research

For future work, it is recommended to evaluate the consumer behavioural factors that would drive the usage of mobile -based NFC contactless payments or whether any Black Swan event, for instance, the COVID-19 that could reach cause contactless payment technology to reach a critical mass of widespread adoption. Additionally, the analysis can be beyond the variables chosen for the UTAUT model for Instance, exogenous factors influencing the adoption of new technology can also be accounted for future researches besides prolonging the number of respondents for improved outcomes.

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Sustainability of the Banking System: Changes for Business

Angelė Lileikienė
Lithuania Business College
Klaipėda, Lithuania

Simona Grigaliūnienė
Lithuania Business College
Klaipėda, Lithuania

Abstract

The banking sector is a vital component of the economy, playing an important role in ensuring financial stability by forming savings, providing credit, facilitating various banking financial operations. Banks not only influence economic growth, but also act as intermediaries between attracting and disbursing cash flows to economic entities. And in this case, the role of banks in shaping the sustainability of the economy is important. Considering the banking sector, the delivery of the financial products and services that address the needs of people safeguard the environment, and yield profits, are encompassed by the sustainable banking. Today's focus is attaining a sustainable Bank 4.0 by acknowledging sustainable development as an approach, which can encompass the economic, environmental, and social dimensions of business growth, referred as three pillars of sustainability. The sustainability of the banking system was directly influenced by the provisions of Basel III. Recent years (2019-2022), the sustainability of operations has been observed in the activities of commercial banks, capital adequacy has increased, the number of deposits has increased, its level of non-performing loans. The present research has disclosed the trend that while ensuring the compliance of commercial banks with the regulatory liquidity requirement, a loan ratio, including loan substitutes such as leasing, has been decreasing in recent years, especially in the post-crisis period. Modelling of the Basel III directives on liquidity standards has shown that all commercial banks, which were analysed in the present study, had surplus liquidity and capital adequacy ratios before the Basel III integration; the surplus liquidity and capital adequacy ratios have been retained after implementation of the Basel III framework as well. Survey reveals that the willingness of both companies and residents to borrow is decreasing, influenced by the price of money, a weakened desire to buy a home, and, in general, increased uncertainty about prospects and sustainability of banks.

Keywords: sustainability, banking sector, social responsibility, the Basel III requirements, EU taxonomy regulation.

1. Introduction

Sustainability is the mostly investigated topic today, investigated by the researchers in the whole world. Considering the banking sector, the delivery of the financial products and services that address the needs of people safeguard the environment, and yield profits, are encompassed by the sustainable banking (Khan, et al., 2021). Some authors characterize that sustainability encompasses the economic, social, and environmental aspects (Azouaoui, et al. 2023). Isaksson et al. (2009) characterizes sustainability as the expansion of a company, commendable economic efficiency, and sustained profitability in a long run. Some authors also focus on attaining a sustainable Bank 4.0 by acknowledging sustainable development as an approach, which can encompass the economic,

environmental, and social dimensions of business growth, referred as three pillars of sustainability (Ellili et al., 2023; Stojčič et al. 2019). Social sustainability is concerned with promoting human well-being, and in banking industry, this means expanding employment possibilities, charitable giving, and collaboration and engagements with the community (Azouaoui, et al. 2023; Kurila et al. 2016). Banks together with other institutions must consider into environmental concerns, making decisions that will make long-term impacts, and must implement appropriate environmental strategies helping solving problems and achieve environmental sustainability (Lubchenco et al., 1998; Malaquias et al., 2020). While economic sustainability focuses on the enduring economic impact, achievements, prioritizing long-term economic prosperity, the economic viability of banks is crucial for their survival and long-term success (Azouaoui, et al. 2023; Preacher et al.

The banking sector is one of the most regulated sectors, as banking activities directly affect the entire economy. The regulation of banks is implemented through the established operational risk control and regulatory limits or coefficients. The European Central Bank (ECB) approved a whole package of directives on the implementation of the pegged exchange rate across Europe: 1) Blueprint: Europe 2050 - climate neutral continent, 2) Directing investment to companies that support this transition.

The sustainability of banking activities has been examined by several foreign authors in various aspect (Bergen et al., 2009; Hagendroff et al., 2012; Said et al., 2008, Shmieder et al. (2011), and national authors (Lileikienė, 2021; Kovalčik, 2014; Likus, 2012; etc.). However, the studies by the above authors still display certain limitation of the analysis since they mostly focus on the analysis of the effectiveness of the Basel III directives. During the period of economic recession/crisis, it became necessary to analyze the sustainability problems of the banking system, including ESG Investing (ESG stands for environmental, social and governance, also refers to how companies score these responsibility metrics and standards for potential investments) context.

Research purpose: Define ESG factors role of the banking sector and how it impacts the business, when assessing the sustainability of investments. To achieve the aim the following objectives have been formulated:

- To analyse the trends of performance of the banking sector in Lithuania.
- To analyse the capital adequacy and sustainability of banks in Lithuania.

2. Literature Review and Related Works

The problem of sustainability is today's issue. This topic is studied in business companies, universities, and global institutions. The origin of the research problem is determined by different approaches of researchers on the effectiveness of the International regulatory Framework for banks, or Basel directives. The Basel accords refer to a series of three sequential international banking regulation agreements (Basel I, II and III) set by the Basel committee on bank supervision (BCBS), which has drawn up standards to ensure that banks and other credit institutions maintain enough capital and liquidity to meet their obligations and absorb unexpected losses (European Council, 2024). Also, Basel III directives, designated to ensure the impact of stability of the commercial banking system on the overall sustainability of the financial system. The specific feature the problem, which is analyzed in the present study, is related with the fact that a continued project – adaptation of the Basel III directives in operation of commercial banks – is currently in progress both in Lithuania and across the European Union, which has direct impact on the stability of the financial system. The Basel III requirements for limitation of operational risk are based on the liquidity and capital adequacy ratios. Failure to maintain the required rate of the above ratios leads to a bankruptcy of a commercial bank, which to a greater or lesser extent affects the sustainability of the commercial banking and financial system as a whole. This conceptual approach has been validated in research studies by the following foreign authors: Hendricks et al., 2007; Cerutti et al., 2011; Halande and May, 2011; Allen et al. 2012 and Weis et al., 2014. The authors agree that systemic risk arises when operational problems in one commercial bank affect performance of other commercial banks, such

problems transcend the exogenous boundaries of a single country and start spreading globally thereby affecting the entire financial system. Their argument is supported by the resolutions of Bank of Lithuania's (2008, 2009, 2011) and such national authors as Deltuvaitė, 2009; Martinaitytė et al., 2012 and Ambrasas, 2014.

New trends in economic development, the use of information technology and the globalization of the world economy present new challenges to business companies, governments, and all humanity. Therefore, the concept of sustainability (coherence) is also used in business. European Union (EU) shows progress of preparation and consideration of the package of EU Laws: directives offer (2021), directive adopted (2022), in December revision to the project notes (2023), the law has entered into force on 01.07.2024. The progress of preparation and consideration of the package of EU Laws (Fig.1).

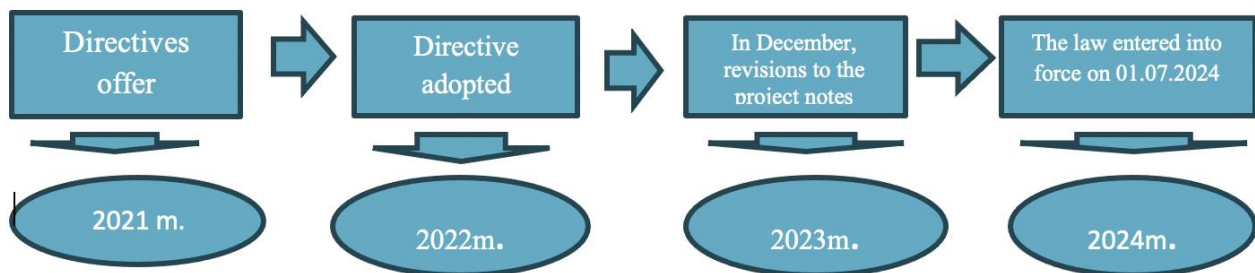


Fig. 1 The progress of preparation and consideration of the package of EU Laws

The data in the Table 1 shows that the Basel III requirements and Taxonomy Regulation are aimed at increasing the capital adequacy ratio with the purpose to ensure the stability of banks' performance and at the same time the sustainability of entire financial system. The EU Taxonomy Regulation establishes criteria for determining whether an economic activity can be considered environmentally sustainable and attempts to determine the degree of sustainability of investment.

Table 1. Stages of integration of the capital adequacy ratio (Source: Statistic data)

	2017	2018	2019	2020	2021	2022	2023
Min. share of common equity	3,5	4	4,5	4,5	4,5	4,5	4,5
Capital conservation buffer				0,625	1,25	1,875	2,5
Min. + buffer capital	3,5	4	4,5	5,125	5,75	6,375	7
Regulatory adjustments		20	40	60	80	100	100
Min. Tier I	4,5	5,5	6	6	6	6	6
Min. in total	8	8	8	8	8	8	8
Min. in total + Capital conservation buffer	8	8	8	8,625	9,25	9,875	10,5
Non-liquid instruments	90	80	70	60	50	40	30

The sustainable business models offer competitive advantages for banks, that can be identified as a better reputation and brand differentiation, also in attraction more loyal customers and increasing the market share (Torre Olmo et al. 2021). And while some of the authors claim that sustainable actions also improve banks' reputation, lowering their funding costs and giving them access to more investments (Bassen et al. 2020), others state that sustainable practices can be costly and can have also adverse effects on bank efficiency (Nidumolu et al. 2009). But since the sustainable development has been the priority of many international organizations, especially then most important steps were made in 2015 by the United Nations (UN) with the adoption of Sustainable Development Goals (SDGs), it should be noted that the banking sector plays a crucial role in achieving these goals because its involvement in sustainable activities have a potential impact on the sustainability of other

industries through the leading channels (Scholtens, 2012). Therefore greener – and climate related themes have increasingly become mainstreamed in the banking sector and demands by their clients grow, banks started launching dedicated green financial products and services, mostly using customizing their existing offerings (Hyoungkun and Dae Kim, 2020). The 2019 European Green Deal also highlights the transformation of all sectors of the economy and prioritizes the direct flows towards green and more sustainable investments (European Commission, 2020), and the sustainable banking approach is becoming increasingly important (Hecker, 2015).

3. Case study

As the conducted research studies show, after injection of the Basel III directives the capital adequacy ratio will increase up to 10,5 %. The capital adequacy analysis was performed pursuant to the requirements of the Capital Requirement Directive (CRD IV), section 8 of the Capital Requirement Regulations № 575/2013 (CRR) and the implementing technical standards and regulatory technical standards (ITS/RTS) of the European Banking Institution (EBI).

The capital adequacy ratio is established for the tier I capital, tier II capital and the total capital value to risk-weighted assets. The capital adequacy ratio shows how a commercial bank implements strategic business decisions. The dynamic analysis of SEB bank capital adequacy ratio and its trends are shown in Table 2.

Table 2. Analysis of SEB bank’s capital adequacy for the period 2021-2022 (Source: Data of the Bank of Lithuania)

Indicators (in thousand Euros)	Year 2021	Year 2022
Tier I capital	867291	882359
Tier II capital	7992	9357
Total capital	947283	891716
Amount of risk-weighted assets	3411093	3288180
Tier I capital ratio (%)	19.3	19.7
Total capital adequacy ratio (%)	23,1	19,8
Surplus of Tier I capital (%)	14,8	15,2

As the results of the research show, in the year 2022 as compared to 2021, SEB bank had Tier I capital ratio exceeded by 0,7 percentage point, i.e., in 2021 the capital adequacy surplus amounted to 14,8 % at the required 4,5 % ratio, and in 2022 –15,2 % excluding the reserves. The total capital adequacy ratio in 2021 was 23,1 proc., and 2022 – 19,8 proc. Dynamic analysis of banking system activity in 2018-2022 year is show in Table 3.

Table 3. Dynamic analysis of banking system activity in 2018-2022 (Source: Data of the Bank of Lithuania)

Indicator	2018	2019	2020	2021	2022
Property (billn. €)	28.6	30.7	37.7	42.84	53.0
Profit (thous. €)	357.9	334.5	279.9	328.9	343.4
Capital adequacy ratio (%)	16.6	19.89	23.16	23.12	19.86
Level of non- performing loans (%)	2.4	1.6	1.28	0.66	0.58
Deposits (mln. €)	22274	24963	31880	35110	42230

The present research has disclosed the trend that while ensuring the compliance of commercial banks with the regulatory liquidity requirement, a loan ratio, including loan substitutes such as leasing, has been decreasing in recent years, especially in the post-crisis period; if in 2014 this ratio amounted to 108 %, then in 2017 it did not even make 98 %, but from 2019 to 2022, the level of non-performing loans began to decrease significantly, the indicator stabilized, respectively, in 2019, the indicator reached 1.6, in 2020 - 1.28, and in 2022, the indicator level reached - 0.58, which indicates the process of bank stabilization. In other hand, in assessing the sustainability of the banking system, the EU

Taxonomy Regulation was adopted. EU taxonomy - the division of investments into sustainable and unsustainable. Purpose: increase transparency, promote sustainable projects and provide clear loan evaluation criteria.

Banks' sustainability is focused on ESG risk (environmental, social and governance risk) these are factors that include potential negative effects of environmental degradation, social discord and governance short-term effects on the company's financial results, reputation and long-term for sustainability, the whole. It is therefore the task of the banking system to ensure that sustainable financing is aligned with environmental objectives by introducing criteria based on a taxonomy that defines the types of investment projects suitable for sustainable financing. The ESG risk assessment process for a business client is shown in Table 4

Table 4. The ESG risk assessment process for a business

ESG	Aims	Risk processes
Environmental protection	Climate change and environmental degradation endangering the social, economic, and business environment	<ul style="list-style-type: none"> • The client's impact on the environment - emission of greenhouse gases, waste management, pollution, preservation of biodiversity. • A strategy for reducing the emissions of pollutants into the atmosphere. • Real estate used in the client's activities (energy efficiency class, geographic location of the property, etc.)
Social responsibility	Impact on employee health, safety, diversity	<ul style="list-style-type: none"> • Labor relations, rights, diversity. • Employee welfare, working conditions, safety measures, accidents. • Contribution to social development and well-being (qualification improvement, nature of work, etc.)
Governance	Processes that ensure effective management of companies	<ul style="list-style-type: none"> • Transparency and accountability processes, including information disclosure practices. • Company management practices, composition, and independence of management bodies. • Executive compensation, shareholder rights, transparency, and ethical business conduct. • Prevention of money laundering, corruption, and bribery. • Compliance with legal requirements

Banks, when making investment decisions regarding the sustainability of financing, are increasingly taking ESG factors into account when assessing the sustainability of investments.

4. Conclusions

Referring to the Basel III framework, international and national research studies, and the dynamic analyses of banking system activity in Lithuania, the following conclusions can be made. Since 2015 the Basel III ongoing project has been started in the Lithuania country, implementation of which through CRD IV package took place over a 7-year period, i.e., in 2013 – 2019. The key modifications introduced by the Basel III in terms of the requirements for limitation of operational risk are related with introducing a new liquidity coverage ratio and increase of the capital adequacy ratio. Modelling of the Basel III directives on liquidity standards has shown that all commercial banks, which were analysed in the present study, had surplus liquidity and capital adequacy ratios before the Basel III integration; the surplus liquidity and capital adequacy ratios have been retained after implementation of the Basel III framework as well. Even if the Basel III regulatory liquidity ratio became mandatory

in 2019, the identified trends allow concluding that commercial banks would continue maintaining the surplus liquidity and capital adequacy ratios that would allow ensuring the stability of the banking sector and would provide prerequisites for the sustainability of the entire financial system in Lithuania. In assessing the level of inflation, the ECB has not changed the basic interest rate in recent years, which will remain at 4.5 percent. The European Central Bank (ECB) raising interest rates and reducing the money supply is affecting the economy slowly and is only beginning to negatively affect residents and businesses. A survey of commercial banks in the euro area conducted by the ECB shows that since the end of last year, an increasing number of them have been tightening their lending conditions. The same survey reveals that the willingness of both companies and residents to borrow is decreasing, influenced by the price of money, a weakened desire to buy a home, and, in general, increased uncertainty about prospects and sustainability of banks.

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