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Track 1: ICT and Resilience Building: Climate Change, Pandemic, and Other Stressors

ORGANIZATIONAL RESILIENCE BETWEEN COMPETING NETWORKS OF INFOMEDIARIES: A CASE STUDY IN CIVIL SOCIETY RESILIENCE IN HONG KONG

Sophie Zinser and Dr. Hannah Thinyane

This study explores how non-governmental organizations (NGOs) in Hong Kong can be considered as ‘infomediaries’ (UNDP, 2003) in their use of information and communication technologies (ICTs) to support resilience-building across a growing population of migrant domestic workers (MDWs). It also acknowledges MDWs effective existing self-organizing community networks, including religious groups and labour unions. This study maps how NGO infomediaries are currently supporting MDW communities. It posits that NGOs are uniquely capable of developing ICTs grounded in local legal, psychological, and cultural contexts to improve MDW community resilience. The study finds that the fragmented nature of technology use between NGO infomediaries and the competition between NGOs for funding hinders NGO infomediaries’ ability to support building lasting resilience within the MDW community. Recommendations from this study seek to align NGO infomediary tool development more closely with the MDW community in Hong Kong’s existing communicative ecologies. It considers NGOs as infomediaries capable of adapting and streamlining various linkages across grassroots MDW social organizations, local community leaders, and governments that impact the MDW community. This study is a tool for NGO infomediaries to understand the types of resilience networks that they are uniquely capable of building with MDWs in Hong Kong.

DIGITAL RESILIENCE AND THE CONTINUANCE USE OF MOBILE PAYMENT SERVICES

Muftawu Dzang Alhassan and Martin Butler

The use of mobile payment services is an essential contributor to financial inclusion in emerging markets. Unfortunately, the service has become a platform for fraud. Mobile payment users need to be digitally resilient to continue using the service after adverse events. However, there is scant literature on users' continuance use of mobile payment services in the post-event of fraud. The focal point of prior literature has been on technology adoption or threat avoidance to implement policies that protect users. Analysing the relationship between individual digital resilience and post-adoption behavioural patterns will enable service providers to support individual digital resilience to promote users' continuance use of the service. This research aims to develop and empirically validate a conceptual model to examine individual digital resilience in the context of the continuance use of mobile payments. The model will be based on protection motivation theory. Survey data will be obtained from victims of mobile payment fraud and other users who continue using the service despite their knowledge of mobile payment fraud. The results from this study are expected to make key contributions to theory, practice, and policy in the areas of digital resilience, mobile payments, and ICT4D.

DESCRIBING EMERGENCY REMOTE TEACHING USING A LEARNING MANAGEMENT SYSTEM: A SOUTH AFRICAN COVID-19 STUDY OF RESILIENCE THROUGH ICT

Ammar Canani and Lisa F. Seymour

In an effort to counter the spread of COVID-19 many schools were forced to shut down. Primary schools in South Africa were forced to shift to emergency remote teaching abruptly relying on using a Learning Management System (LMS) to aid their teaching. LMSs helped primary schools build resilience to cope with unexpected events. An opportunity rose to study the affordances and

hconstraints faced when using a LMS for remote teaching, specifically for primary school learners ('Gen Z') – a largely ignored area of research. Through a case study of 6 schools, this research describes the affordances and constraints of the LMS supported teaching system in use in primary schools. Affordances related to schools, learners and teachers while constraints were classified from a financial, technological, school, learner and teacher perspective. Noteworthy affordances included using LMSs as notice boards and satisfying parents, the key stakeholders. In terms of constraints, the digital divide was a recurring theme while device and data costs were consistently a limitation. There were many cases of schools not realizing the full potential of LMS usage. This research should be useful for primary schools wanting to use a LMS for their teaching.

NETWORK WEAVING TO FOSTER RESILIENCE AND SUSTAINABILITY IN ICT4D

Mario Marais and Sara Vannini

A number of studies in Information and Communication Technologies for Development (ICT4D) focus on projects' sustainability and resilience. Over the years, scholars have identified many elements to enable achievement of these goals. Nevertheless, barriers to achieving them are still a common reality in the field. In this paper, we propose that special attention should be paid to communities' relationships, self-organizing, and social capital - and the people's networks that enable them - within ICT4D scholarship and practice, as a way to achieve sustainability and resilience. Building on Green's work (2016) on social change as a force that cannot be understood without focusing on systems and power, we claim that ICT4D would benefit from intentionally growing social capital and fostering networks within its systems. We propose "network weaving" (Holley, 2013) as a practical approach, and we explore its potential to complement and advance existing ICT4D frameworks and practices, including the sense of community of the researchers themselves.

TOWARDS AN INTEGRATED KNOWLEDGE MANAGEMENT AND INFORMATION AND COMMUNICATION TECHNOLOGY FRAMEWORK FOR IMPROVING DISASTER RESPONSE IN A DEVELOPING COUNTRY CONTEXT

Teurai Matekenya and Ephias Ruhode

This paper is part of an ongoing project that seeks to address a gap in disaster information coordination and collaboration in Zimbabwe. There is lack of coordinated information and knowledge in natural disaster and emergency situations in Zimbabwe. This results in weak collaboration links among the various organizations that respond to emergencies, leading to slow decision making processes and long response times. This negatively affects the affected communities, exacerbating poverty in Zimbabwe. This has been evidenced in the recent catastrophic cyclone Idai where many people were left dead, infrastructure destroyed and some people marooned. To address this, the research seeks to develop an integrated Knowledge Management and ICT framework that aid in coordination and collaboration among the various crisis responders. This will be achieved through a case study approach using Zimbabwe's Civil Protection Unit. PAR within DSRM will be used to gather data from CPU as well as with NGO respondents, traditional leaders and disaster response experts. Findings will be compared and contrasted with secondary data gathered in literature, this, with collected data will be used in developing a home grown coordination and collaboration solution. Qualitative approach to data collection will be adopted using interviews, visioning workshops and document analysis.

DIGITAL RESILIENCE TO COVID-19: A MODEL FOR NATIONAL DIGITAL HEALTH SYSTEMS TO BOUNCE FORWARD FROM THE SHOCK OF A GLOBAL PANDEMIC

Scott Russpatrick, Johan Sæbø, Eric Monteiro, Brian Nicholson and Terje Sanner

COVID-19 represented a major shock to global health systems, not the least to resource-challenged regions in the Global South. We report on a case of digital, information system resilience in the response to data needs from the COVID-19 pandemic in two countries in the Global South. In contrast to dominant perspectives where digital resilience enables bounce back or maintenance of a status quo, we identify five bounce forward resilience preconditions (i) distributed training, (ii) local expertise (iii) local autonomy and ownership (iv) local infrastructure and (v) platform design infrastructure. These preconditions enable an elevated degree of resilience that in the face of an external shock such as COVID-19 can deliver a bounce forward or strengthening of the information system beyond its pre-shock state.

A CLIMATE CHANGE VULNERABILITY ASSESSMENT FRAMEWORK: A SPATIAL APPROACH

Claudia Cáceres, Yan Li and Brian Hilton

Climate change is affecting every known society, especially for small farmers in Low-Income Countries because they depend heavily on rain, seasonality patterns, and known temperature ranges. To build climate change resilient communities among rural farmers, the first step is to understand the impact of climate change on the population. This paper proposes a Climate Change Vulnerability Assessment Framework (CCVAF) to assess climate change vulnerabilities among rural farmers. The CCVAF framework uses information and communication technology (ICT) to assess climate change vulnerabilities among rural farmers by integrating both community level and individual household level indicators. The CCVAF was instantiated into a GIS-based web application named THRIVE for different decision-makers to better assess how climate change is affecting rural farmers in Western Honduras. Qualitative evaluation of the THRIVE showed that it is an innovative and useful tool. The CCVAF contributes to not only the knowledge base of the climate change vulnerability assessment but also the design science literature by providing guidelines to design a class of climate change vulnerability assessment solutions.

ROLE OF INFORMATION AND ICTS AS DETERMINANTS OF FARMER'S ADAPTIVE CAPACITY TO CLIMATE RISK: AN EMPIRICAL STUDY FROM HARYANA, INDIA

Priya Chetri, Upasna Sharma and P. Vigneswara Ilavarasan

Using the primary data collected for 463 farmers in six districts of Haryana, India, the present study attempts to understand the constituents of farmer's adaptive capacity at local level and how it can be enhanced. We use path analysis technique using the lavaan package in RStudio to empirically test the role of information. We find that information is a direct and significant contributor to enhancing farmers' adaptive capacity. However, even with exponential growth in use of technology, particularly information and communication technologies (ICTs), small farmers still lack access to information which hinders their capacity to respond to weather and climate risks. Thus, understanding the mechanism that can facilitate exchange and use of information by the farming community more effectively is important. We take an ensemble view of ICTs operationalized using ICT ecosystem and find significant interlinkages between information, technology and the ICT ecosystem that facilitate learning and information exchange and therefore contribute to enhancing farmers' adaptive capacity and building resilience to climate shocks. We find that ICT ecosystem does facilitate access to information and also mediate the

effect of farmer's capability and willingness to use ICTs for agricultural purposes. Development of sound ICT ecosystem is likely to help farmers to better respond to changing climate in the future.

BUILDING RESILIENT INFORMATION SYSTEMS FOR CHILD NUTRITION IN POST-CONFLICT SRI LANKA DURING COVID-19 PANDEMIC

Pamod Amarakoon, Jørn Braa, Sundeep Sahay, Lakmini Magodarithna and Rajeev Moorthy

Post-conflict, low-resource settings are menaced with challenges related to low-resources, economic and social instability. The objective of the study is to understand the socio-technical determinants of resilience of routine information systems a backdrop of an implementation of a mobile-based nutrition information system in a post-conflict district in Sri Lanka. The longitudinal events in the study spans across several years into the period of COVID-19 pandemic and tries to understand the process of developing resilience of in a vulnerable district. The qualitative study deploys interviews, observations and document analysis for collection of empirical data. The case study reveals the long-standing capacity building, leadership and local governance, multisector collaboration, platform resilience and empowering of field health staff contribute in building resilience in everyday context. The empirical insights include the mechanisms in building resilience in routine system in low resource settings while promoting data quality and data use at field level.

EARTH OBSERVATION AND THE NEW AFRICAN RURAL DATASCAPES: DEFINING AN AGENDA FOR CRITICAL RESEARCH

Rose Pritchard, Wilhelm Kiwango and Andy Challinor

The increasing availability of Earth Observation data could transform the use and governance of African rural landscapes, with major implications for the livelihoods and wellbeing of people living in those landscapes. Recent years have seen a rapid increase in the development of EO data applications targeted at stakeholders in African agricultural systems. But there is still relatively little critical scholarship questioning how EO data are accessed, presented, disseminated and used in different socio-political contexts, or of whether this increases or decreases the wellbeing of poorer and marginalized peoples. We highlight three neglected areas in existing EO-for-development research: (i) the imaginaries of 'ideal' future landscapes informing deployments of EO data; (ii) how power relationships in larger EO-for-development networks shape the distribution of costs and benefits; and (iii) how these larger-scale political dynamics interact with local-scale inequalities to influence the resilience of marginalised peoples. We then propose a framework for critical EO-for-development research drawing on recent thinking in critical data studies, ICT4D and political ecology.

MARKET DIGITALIZATION AND RESILIENCE IN CRISIS TIMES: A FRAMEWORK PROPOSAL

Guillermo J. Larios-Hernandez

Based on a conceptual framework that integrates three dimensions of digital transformation (DT), namely, the nature of the product, client interaction, and the level of coordination with industry players, this paper aims to explain the level of influence that contextual crisis factors may have played in organizational digitalization choices in search for resilience as part of adaptation strategies. In particular, this investigation would analyze digitalization choices as survival strategies for COVID-19 crisis in the case of Mexican enterprises. The selected country is of particular interest as a research target in the Global South, in that public policy has offered little support to keep business organizations up and running, leaving entrepreneurs with no other option

but to implement bottom-up resilience strategies, including digitalization. Qualitative Comparative Analysis (QCA) has been proposed to identify combinations of conditions to explain the role played by COVID crisis-related contextual factors that may have led to particular forms of digitalization. Semi-structured interviews with industry associations are also proposed to gain knowledge about group responses to the crisis.

DIGITAL RESILIENCE FOR WHAT? CASE STUDY OF SOUTH KOREA

Kyung Ryul Park, Sundeep Sahay, Jørn Braa and Pamod Amarakoon

Resilience has become an emerging topic in various fields of academic research. In spite of its widespread use, there remains conceptual confusion over what resilience means particularly in multi-disciplinary studies including the field of ICT and Development. With the potential of digital technology, research is needed to critically question what key socio-institutional values related to resilience are being strengthened, for what and for whom through the different conceptualizations of resilience. In this study, we conduct an interpretive case study on South Korea's response to the pandemic and construct a chronological narrative to identify key aspects of digital resilience. We identify agility, diversity, and plurality - enabled by active roles of various stakeholders, including citizens, research communities, and private sector - as keys to digital resilience to the pandemic. Findings from the case of South Korea provide implications to ICT4D research while discussing how developing countries, where a national single window platform is typically implemented with greater level of homogeneity, achieve digital resilience with inclusive innovation with plurality of diverse platforms.

Track 2: Digital Platforms in, from and in-between the Global South and North

A RESILIENT ICT4D APPROACH TO ECO COUNTRIES' EDUCATION RESPONSE DURING COVID-19 PANDEMIC

Azadeh Akbari

According to the United Nations, schools' closures have impacted up to 99 per cent of the student population in low and lower-middle-income countries. This research-in-progress report introduces a project on Emergency Remote Teaching (ERT) measures in the ten member states of the Economic Cooperation Organization (ECO) with a focus on the application of Information and Communication Technologies (ICTs) in primary and secondary education levels. The project takes a comparative approach within a resilient ICT-for-Development (ICT4D) framework, where the coping, endurance, and return to pre-crisis functionalities in education systems are studied. The preliminary research demonstrates the impacts of the country's general COVID-19 strategy, the education system in place, and digital infrastructure's level of development on instigating distance-learning platforms. The paper further shows that in addition to access to stable internet connections and digital devices, other infrastructural factors such as access to food, electricity and health services play a significant role in education response planning and implementation. Human factors in the education system, such as teacher training for the usage of ICTs, digital literacy of students and parents, and already existing vulnerabilities in the education system pose challenges to crisis management in the education sector. Other socio-political factors such as attitudes towards girls' education, level of corruption, institutional capacity, and international sanctions or available funds also make the education system less resilient.

STUDENTS' ENGAGEMENT IN ANONYMOUS PEER REVIEW: USING THE OPEN-SOURCE SAKAI PLATFORM

Fazlyn Petersen and Bradley Groenewald

There is a need to provide quality education without discrimination or prejudice to all students. However, there are challenges in implementing quality education in large classes, especially during remote learning. Literature indicates that providing lecturer feedback can become a tedious task, especially in large classes. Literature states that involving students in the peer review process can improve the quality of their submissions. This research used a case study and thematic analysis. Qualitative data were collected from 179 third-year Information Systems students who used the Opensource Sakai Platform. Students reviewed another student's report, without knowing their identity. The research used self-determination theory as a theoretical basis. The achievement of perceived autonomy is supported as an anonymous peer review helped students to empower themselves. Perceived competence was also achieved as the anonymous peer review improved the quality of work submitted and the development of workplace skills. Perceived relatedness is supported as students indicated that the anonymous peer review allowed them to learn from their peers. It also improved their understanding and the ability to see errors in their work. Despite the negative aspects identified using the Sakai platform, it may provide a viable alternative for providing feedback remotely, especially during the Covid-19 pandemic.

ACCESS TO DIGITAL PLATFORMS: CAN 'MOBILE' NETWORK COVERAGE REPORTS BE RELIED UPON? OBSERVATIONS FROM RURAL ZAMBIA AND ZIMBABWE

Gertjan van Stam

As access to digital platforms in Africa is mostly through 'mobile' networks, this paper addresses the mismatch of universalised reports on 'mobile' access and the experiences from digital health

practice and cases in Zambia and Zimbabwe. Further, the paper shines a critical light on the meaning of terms like access and the 4th industrial revolution from an African context. It argues for the need to invest in contextual research and development, also to gain a comprehensive understanding of how to access digital platforms in and from Africa.

TRANSCENDING OLD BOUNDARIES: DIGITAL AFTERLIFE IN THE AGE OF COVID-19

Mashiat Mostafa and Faheem Hussain

The primary objective of our exploratory research is to contribute to the ongoing conversation on Digital Afterlife from the lenses of Global South during the COVID-19 period. Digital Afterlife is fast becoming a challenge for our increasingly connected society. Moreover, the situation got worse with the COVID-19 pandemic. The on-going research is to address the disparity in the Global South, specifically in countries like Indonesia, India and The Philippines compared to the Global North for Digital Afterlife services such as policies and digital mourning services. By addressing the research question, ‘What services and policy frameworks are available for Digital Afterlife in the Global South during COVID-19?’, we aim to find the multitude of ways people in the Global South are managing their digital footprints. Our preliminary findings show that some considerable research and death related digital services and innovation have taken place during the pandemic. However, overwhelming majority of these works are western-centric and mainly dealing with post-mortem personal asset management. Cultural nuances, socio-economic perspectives, religion, political climate, regional infrastructures are mostly sidelined. We found significant disparity in Digital Afterlife product and service designs, which got worse during the global pandemic. Our goal is to collect further in-depth data within the three big ICT powerhouses of global south (Indonesia, India and The Philippines), identify the challenges as well as the innovations around Digital Afterlife. We envision proposing a set of recommendations, based on our findings, for developing a more inclusive and equitable digital space in this pandemic-stricken world.

DESIGNING MOBILE HEALTH FOR USER MANAGEMENT: THE IMPORTANCE OF SOCIO-TECHNICAL APPROACH

Tochukwu Ikwunne, Lucy Hederman and P.J. Wall

Despite the significance of user engagement for efficacy of mobile health (mHealth) in the Global South, many such interventions do not include user-engaging attributes. This is because socio-technical aspects are frequently not considered during the design, development, and implementation, stages of such initiatives. In addition, there is little discussion in the literature about the role socio-technical factors play in user-centered design processes for mHealth. This research posits consideration of socio-technical factors is required as techno-centric approaches to mHealth design and user engagement, as well as those relying on existing universal frameworks for user-centered design, have proven to be ineffective with the result that most mHealth projects in the Global South fail to sustain. This research examines projects in Sierra Leone where semi-structured interviews were conducted with mHealth designers and developers in order to explore their attitudes towards user engagement in this case. Barriers and facilitators to user engagement were identified and classified as either technical or socio-technical. Findings from the study indicate that adoption of a techno-centric approach without consideration of socio-technical factors can negatively affect user’s engagement. Based on these findings, we propose to develop a new design framework for more effective inclusion of user-engaging attributes in mHealth.

UNDERSTANDING THE INTERPLAY BETWEEN BOUNDARY RESOURCES AND GOVERNANCE PRACTICES IN INFLUENCING ECOSYSTEM VALUE CO-CREATION FOR DIGITAL PLATFORMS IN THE GLOBAL SOUTH

Elijah Chirwa, Pamela Abbot and Jonathan Foster

Despite their potentially transformative impact, few studies have investigated how commercially-driven digital platforms such as mobile money facilitate ecosystem value co-creation in the global South. Consequently, using a boundary resources model and platform governance approaches, this paper aims to examine how a payment platform facilitates ecosystem value co-creation with third party actors. An in-depth qualitative inquiry was adopted for the study using an embedded single-case design. The results show that although ecosystem value co-creation was enabled by the introduction of boundary resources tools, some platform governance practices hindered some complementors from harnessing the affordances of the platforms. These constraints include lack of visibility of the boundary resources and transparency challenges in the acceptance criteria. We thus argue that platform generativity on its own is not sufficient to support ecosystem value co-creation, but requires appropriate platform governance to deal with behavioural complexity of ecosystem actors by using optimal control mechanisms.

IMPROVING DATA USE AND PARTICIPATORY ACTION AND DESIGN TO SUPPORT DATA USE: THE CASE OF DHIS2 IN RWANDA

Magnus Li, Scott Russpatrick, Jørn Braa, Andrew Muhire, Adolphe Kamungunga, Kai Vandivier, Silvia Masiero, Alexander Bruland, Peichun Wu, Peter Biro, Mikael Olsen Rodvelt and Stian Rustad

This article reports from an ongoing ‘evaluation for improvement’ action research and participatory design project in Rwanda, where the aim is to improve data use practices and the capabilities of the District Health Information Software 2 (DHIS2), an open source health information management platform, to support data use. The study of data use at health facility and district level showed that while data was used routinely at, for example, monthly coordination meetings, the DHIS2 dashboards and other analytical tools were in limited use because users preferred to use Microsoft Excel for data analysis and use. Given such findings, a major focus of the project has been directed towards identifying shortcomings in data use practices and in the software platform and to suggest, design and eventually implement changes. While the practical work on implementing improvements have been slow due to the COVID-19 pandemic, the suggested design improvements involve many levels of system design and participation, from the global core DHIS2 software team, the country DHIS2 team and local app development, the Rwanda Ministry of Health, and health workers at local level.

ROLE OF DIGITAL PLATFORMS IN ENTREPRENEURIAL PROCESSES: A RESOURCE ENABLING PERSPECTIVE OF STARTUPS IN PAKISTAN

Hareem Nassar and Fareesa Malik

This article aims to explore the role of digital platforms as external enablers in entrepreneurial processes. The recent infusion of digital platforms into different aspects of innovation and entrepreneurship has supported digital entrepreneurship; however, the altered entrepreneurial processes are yet to be explored. This study focuses on digital platform-based startups of Pakistan and draws on entrepreneurial bricolage theory to understand the enabling external resources. We followed multiple qualitative case studies approach and collected data through semi-structured interviews from two startups operating solely on digital platforms, 1) XYLEXA and 2) Toycycle. The findings show that entrepreneurial process is a continuous process. Digital platforms have made entrepreneurial processes less bounded i.e. the products and services keep on evolving even

after they have been endorsed to the end user. Moreover, platform-based startups having limited resources can move through the entire entrepreneurial process by combining available resources efficiently and effectively.

E-COMMERCE FOR RURAL MICRO-ENTREPRENEURS: MAPPING RESTRICTIONS, ECOLOGIES OF USE AND TRENDS FOR DEVELOPMENT

Aditi Bhatia-Kalluri

This paper addresses the struggle of rural micro-entrepreneurs in the Global South in utilizing e-commerce to reach wider markets. This research paper looks at the adoption of e-commerce as a sustainable marketplace by the micro-entrepreneur sellers from the lower socio-economic rural communities in India, a booming digital economy in the Global South. ‘Sustainability’ here refers to a model for sustainable economic development sustaining the e-commerce as business model for the rural micro-entrepreneurs to flourish. This paper explores rural development by dismantling the factors that shape the ways technology and trade impact micro-entrepreneurs. The aim is to offer recommendations and solutions to contribute building the e-commerce as a sustainable marketplace for rural micro-entrepreneurs. Recent information and economic policy changes in India, along with the expansion of mobile infrastructure and a growing user base in rural regions makes this research timely and important. By scrutinizing the infrastructure and auditing the information needs and challenges of users, this research will illuminate the gaps that are leading to a lack of sustainable economic development, and information asymmetries discouraging the rural micro-entrepreneurs from selling online. The purpose of the paper is to find hurdles in the sustainable development of e-commerce as a business solution.

THE DECISION CRITERIA USED BY LARGE ENTERPRISES IN SOUTH AFRICA FOR THE ADOPTION OF CLOUD COMPUTING

Tseriwa Bakasa and Ayanda Pekane

Cloud computing is a technology that has become increasingly popular over the past decade within several enterprises. This popularity can be attributed to its benefits, including lower operating costs, improved computational capabilities, increased flexibility and on-demand storage space. As a result, many enterprises are already in various Cloud Computing (CC) adoption and implementation stages. This study investigates the decision criteria used by large enterprises in South Africa (SA) for the adoption of cloud technology. The majority of large enterprises have comprehensive resources, resulting in established Information Technology (IT) systems and infrastructure set up within their organizations. Though this is the case, the adoption of CC by large enterprises has been on the rise. This may not be a surprise as CC literature points out to benefits and influencers of CC adoption. However, the decision criteria used by large enterprises in SA in adopting CC are lacking in the literature reviewed. The study followed an inductive approach making use of qualitative methods. Findings revealed that large enterprises do not make use of a formalized or standardized decision criteria. However, operational cost, enterprise strategic intent and product efficiency formed key criteria for adopting CC. In addition, security, cloud service provider adoption frameworks and data sovereignty were the key criteria used to select a CC service provider. The research will contribute towards CC technology adoption literature, particularly for developing countries.

BOUNDARY SPANNING AND THE SUPPORT OF DIGITAL ENTREPRENEURS: A CASE STUDY OF BAHRAIN

Noora H. Alghatam

This paper explores the role of public and private sector teams as they collaborate to form and manage a community and platform for digital entrepreneurs in Bahrain. The paper employed the theoretical concept of boundary spanners to explore the nature of interactions between the two teams as support digital entrepreneurship and the outcomes that emerged from these interactions. The findings present the nature of the inter-sectoral interactions as boundary spanning that contributed to the initiation and formalization of the community and platform.

REFLECTIONS, LEARNINGS AND PROPOSED INTERVENTIONS ON DATA VALIDATION AND DATA USE FOR ACTION IN HEALTH: A CASE OF MOZAMBIQUE

Nilza Collinson, Zeferino Saugene, Jørn Braa, Sundeep Sahay and Emilio Mosse

The ideal of a country's health information system (HIS) is to develop processes that ensure easy collection of relevant data and enable their conversion to useful health indicators, which guide decision making and support health interventions. In many Low- and Middle-Income Countries (LMICs), actively engaged in health reform efforts, the role of HIS is crucial, particularly in terms of quality of data and its ability to inspire trust in decision makers to actively use routine HIS data. Recognizing digital platforms potential to support those efforts, several interventions have been implemented in many LMICs. In turn, while the transition from paper registers to digital platforms carries the promise of improving data quality processes, this promise has been notoriously complex to materialize in practice. The authors draw upon more than 15 years of experience implementing HIS in Mozambique to understand how the potential of digital platforms have been realized with respect to data quality, what are the gaps and required remedial steps.

CLOUD COMPUTING ADOPTION: OPPORTUNITIES AND CHALLENGES FOR SMALL, MEDIUM AND MICRO ENTERPRISES IN SOUTH AFRICA

Simphiwe S. Sithole and Ephias Ruhode

The purpose of the paper is to determine the opportunities and challenges that lead to cloud computing adoption by SMMEs in South Africa by looking at the factors that influence adoption. The TOE framework is used to contextualize the factors that influence cloud computing adoption and evaluate the opportunities and challenges that are presented by cloud computing to SMMEs in South Africa. An online survey questionnaire was used to collect data from leaders of SMMEs from all geographical regions and business industries in South Africa. A quantitative research approach was adopted to investigate the objectives, and descriptive analysis was used to evaluate the relationships and present the results. The findings of the study show that relative advantage is an important factor in the consideration of cloud computing adoption by SMMEs, while government and regulatory support is perceived as a barrier. Top management support, which has been previously found by other studies to be a significant factor has been found to be insignificant in this study. The study has revealed that cloud computing presents opportunities to SMMEs and improves their competitiveness.

GENDERING OF SMARTPHONE OWNERSHIP AMONG YOUTH: NARRATIVES FROM RURAL INDIA

Renza Iqbal

This study delves into the research question: how does gender influence smartphone ownership and autonomy in using the internet among the youth in rural India? This paper explores the influence of local culture on smartphone ownership and autonomy through an ethnographic study among rural Indian youth by analysing the intersection of gender with other identity axes. The findings show that young people's smartphone ownership and autonomy is shaped by their social and cultural setting, and could lead to various inequalities in their internet usage. This study shows that gender paves way for various disparities with regard to smartphone ownership and internet usage. Decolonisation of the understanding of smartphone ownership and internet usage patterns of the youth in the Global South suggests a reconsideration of the user experience designs and platform policies.

Track 3: Data Science in Public Health: Potential and Challenges

MAPPING OF COVID-19 RISK FACTORS OF CITIES AND REGENCIES IN INDONESIA DURING THE INITIAL STAGES OF THE PANDEMIC

Setia Pramana, Achmad Fauzi Bagus Firmansyah and Mieke Nurmalasari

The aims of this study are to identify risk factors and develop a composite risk factor of the initial stage of COVID-19 pandemic in regency level in Indonesia. Three risk factors, i.e., exposure, transmission and susceptibility, are investigated. Multivariate regression, and Canonical correlation analysis are implemented to measure the association between the risk factors and the initial stage of reported COVID -19 cases. The result reveals strong correlation between the composite risk factor and the number of COVID-19 cases at the initial stage of pandemic. The influence of population density, percentage of people commuting, international exposures, and number of public places which are prone to COVID-19 transmission are observed. Large regencies and cities, mostly in Java, have high risk scores. The largest risk score is owned by regencies that are part of the Jakarta Metropolitan Area.

CONNECTING THE DOTS IN NUTRITIONAL REHABILITATION: A QUALITATIVE STUDY ON ICT AND COMMUNITY BASED CARE

Deepa Austin and Amit Prakash

‘Fragmentation in care’ continuum is often considered as a shortcoming of the Health system whereas, ‘Integration of care’ is widely acclaimed as a viable solution to fragmentation. In the last two decades, Information and communication technologies (ICTs), by virtue of their ability to integrate information for action, has been extensively used in addressing many public health problems like malnutrition. Tackling the public health challenge of malnutrition demands attention to interconnectedness and interactions between multiple systems. In this paper, using a case study of an ICT application used by community workers for malnutrition management in Karnataka, we argue that lack of recognition of interconnectedness and interactions among stakeholders and context can pose a challenge to integration of care. ICTs can be key enablers to overcome fragmentation, provided it recognizes the inherent complexities of malnutrition and its management. We argue that for an effective ICT enabled integration of Severe Acute Malnutrition (SAM) management, a thorough understanding of perspectives of multiple stakeholders together with a rich picture of the contextual dynamics should not be ignored at design and implementation phase.

AN INTERACTIVE DASHBOARD FOR REAL-TIME ANALYTICS AND MONITORING COVID-19 OUTBREAK IN INDIA: A PROOF OF CONCEPT

Arun Mitra, Biju Soman and Gurpreet Singh

Data analysis and visualization are essential for exploring and communicating findings in medical research, especially in epidemiological surveillance. Data on COVID-19 diagnosed cases and mortality, from crowdsourced website COVID-19 India Tracker, Census 2011, and Google Mobility reports have been used to develop a real-time analytics and monitoring system for the COVID-19 outbreak in India. We have developed a dashboard application for data visualization and analysis of several indicators to follow the SARS-CoV-2 epidemic using data science techniques. A district-level tool for basic epidemiological surveillance, in an interactive and user-friendly manner which includes time trends, epidemic curves, key epidemiological parameters such as growth rate, doubling time, and effective reproduction number have been estimated. This

demonstrates the application of data science methods and epidemiological techniques in public health decision-making while addressing the gap of timely and reliable decision aiding tools.

A SYSTEMATIC APPROACH TO CLEANING ROUTINE HEALTH SURVEILLANCE DATASETS: AN ILLUSTRATION USING NATIONAL VECTOR BORNE DISEASE CONTROL PROGRAMME DATA OF PUNJAB, INDIA

Gurpreet Singh, Biju Soman and Arun Mitra

Advances in ICT4D and data science facilitate systematic, reproducible, and scalable data cleaning for strengthening routine health information systems. A logic model for data cleaning was used and it included an algorithm for screening, diagnosis, and editing datasets in a rule-based, interactive, and semi-automated manner. Apriori computational workflows and operational definitions were prepared. Model performance was illustrated using the dengue line-list of the National Vector Borne Disease Control Programme, Punjab, India from 01 January 2015 to 31 December 2019. Cleaning and imputation for an estimated date were successful for 96.1% and 98.9% records for the year 2015 and 2016 respectively, and for all cases in the year 2017, 2018, and 2019. Information for age and sex was cleaned and extracted for more than 98.4% and 99.4% records. The logic model application resulted in the development of an analysis-ready dataset that can be used to understand spatiotemporal epidemiology and facilitate data-based public health decision making.

MEDICAL GRAPHS IN PATIENT INFORMATION SYSTEMS IN PRIMARY CARE

Thea Hvalen Thodesen, Uy Tran, Jens Kaasbøll, Chipo Kanjo and Tiwonge Manda

Graphs are very effective tools in visualizing information and are used in many fields including the medical field. In most developing countries primary care, graphs are used to monitor child growth. These measures are therefore often displayed using line graphs, basing it on three indicators (stunting, underweight and wasting) based on the WHO 2006 Child Growth Standard. Most literature on information visualization of electronic health record data focuses on aggregate data visualization tools. This research therefore, was set out to provide such an overview of requirements for computerized graphs for individual patient data, implemented in a way that all kinds of medical graphs showing the development of medical measures over time can be displayed. This research was interpretive, using a user-centric approach for data collection where interviews and web search was used to ensure that the graphs developed are fit the user requirements. This followed prototype development using one of the three free, open source software libraries for Android that were evaluated. The prototype was then used to refine the user requirements. The health workers interpreted the graphs developed flawlessly.

ESTABLISHING DATA WAREHOUSE TO IMPROVE STANDARDIZE HEALTH CARE DELIVERY: A PROTOCOL DEVELOPMENT IN JAKARTA CITY

Verry Adrian, Intan Rachmita Sari and Hardya Gustada Hikmahrachim

Jakarta is a metropolitan city and among the most dense city in Indonesia. Jakarta has 12 major indicators of standardize health care delivery (*Standard Pelayanan Minimum or SPM*) derivatives from Ministry of Health consists of services related to maternal and neonatal health, school-aged population, working-age population, elderly population, some specific conditions (hypertension, diabetes, tuberculosis, HIV), and also mental health. We planned to construct a data warehouse to provide a single integrated data center. In the first phase (2021), we improve the system by giving responsibility to the health Sub Department of Health of Administrative City for direct data input into a data warehouse. This period also let an introduction and adaptation to new data collection

schemes by using a single entry for the first time. The basic platform use for this system is District Health Information System 2 (DHIS-2), an open-source platform that has been used worldwide, including Ministry of Health Republic of Indonesia. The major advantage of this data warehouse is the simplicity and convenience to collect a wide data from a different source and presenting it faster than using the conventional system. Less data contradiction was also found between health programs with intersecting data. During this transition phase, a double-work is made as data should be input to both the DHIS-2 system by Jakarta and the National Ministry of Health system, but an integration process is ongoing, and hopefully that in 2022 single data entry can be established.

APPLICATION OF EXECUTIVE INFORMATION SYSTEM FOR COVID-19 REPORTING SYSTEM AND MANAGEMENT: AN EXAMPLE FROM DKI JAKARTA, INDONESIA

Verry Adrian, Intan Rachmita Sari and Hardya Gustada Hikmahrachim

SARS CoV-2 infection and transmission are problematic in developing countries such as Indonesia. Due to the lack of an information system, Provinces must be able to innovate in developing information systems related to surveillance of SARS CoV-2 infection. Jakarta Department of Health built a data management system called Executive Information System (EIS) of COVID-19 Reporting. EIS aimed to provide actual data so that current epidemiological analysis is accurate. The main idea of EIS is to provide valid and actual information to stakeholders, which can then be presented in the form of a dashboard. EIS is utilized to push data flow and management for rapid surveillance purposes. This could be the first time in Indonesia that a system reports near-actual data of nearly half a million people daily using an integrated system through a transparent system. The main data presented is important to monitor and evaluate COVID-19 transmission is the cumulative case dan daily case number. Data in EIS also can offer data geographically so that a more detailed analysis could be done. EIS's data and the dashboard help the government in pandemic control by presenting actual data on bed occupancy and availability across hospitals, especially isolation wards. Stakeholders, academic institutions should utilize EIS data and other elements to help Indonesia fight COVID-19.

Track 4: ICT4D and Data Justice

DATA JUSTICE IN DIGITAL SOCIAL WELFARE: A STUDY OF THE RYTHU BHAROSA SCHEME

Silvia Masiero and Chakradhar Buddha

While digital social protection systems have been claimed to bring efficacy in user identification and entitlement assignment, their data justice implications have been questioned. In particular, the delivery of subsidies based on biometric identification has been found to magnify exclusions, imply informational asymmetries, and reproduce policy structures that negatively affect recipients. In this paper, we use a data justice lens to study Rythu Bharosa, a social welfare scheme targeting farmers in the Andhra Pradesh state of India. While coverage of the scheme in terms of number of recipients is reportedly high, our fieldwork revealed three forms of data justice to be monitored for intended recipients. A first form is design-related, as mismatches of recipients with their registered biometric credentials and bank account details are associated to denial of subsidies. A second form is informational, as users who do not receive subsidies are often not informed of the reason why it is so, or of the grievance redressal processes available to them. To these dimensions our data add a structural one, centred on the conditionality of subsidy to approval by landowners, which forces tenant farmers to request a type of landowner consent that reproduces existing patterns of class and caste subordination. Identifying such data justice issues, the paper adds to problematisations of digital social welfare systems, contributing a structural dimension to studies of data justice in digital social protection.

POLICY–PRACTICE CONTRADICTION: CASE OF CLOUD COMPUTING ADOPTION IN THE MALAWI HEALTH SECTOR

Deborah Amos Phiri and Chipso Kanjo

This paper examines the dynamics of policy implementation and how policy contradicts reality on the ground when it comes to practice. The paper finds that despite having well-laid out policy; the actual practice is contrary. Taking data storage policy within the Ministry of Health in Malawi as a case study, the paper highlights that the contextual realities of where Ministry of Health (MoH) data is stored depends on a number of Technology-Organizational-Environmental (TOE) factors. In the wake of cloud computing; some of these factors act as causative factors for data to be stored in the cloud; contradicting the data storage policy.

Track 5: Our Digital Lives (IFIP 9.5 Track)

FACTORS ENHANCING E-GOVERNMENT SERVICE GAPS IN A DEVELOPING COUNTRY CONTEXT

Mahlangu Gilbert and Ruhode Ephias

Globally, the discourse of e-government has gathered momentum in public service delivery. No country has been left untouched in the implementation of e-government. Several government departments and agencies are now using information and communication technology (ICTs) to deliver government services and information to citizens, other government departments, and businesses. However, most of the government departments have not provided all of their services electronically or at least the most important ones. Thus, this creates a phenomenon of e-government service gaps. The objective of this study was to investigate the contextual factors enhancing e-government service gaps in a developing country. To achieve this aim, the TOE framework was employed together with a qualitative case study to guide data collection and analysis. The data was collected through semi-structured interviews from government employees who are involved in the implementation of e-government services in Zimbabwe as well as from citizens and businesses. Eleven (11) factors were identified and grouped under the TOE framework. This research contributes significantly to the implementation and utilisation of e-government services in Zimbabwe. The study also contributes to providing a strong theoretical understanding of the factors that enhance e-government service gaps explored in the research model.

INVESTIGATING PERSONALISATION-PRIVACY PARADOX AMONG YOUNG IRISH CONSUMERS: A CASE OF SMART SPEAKERS

Caoimhe O'Maonaigh and Deepak Saxena

Personalisation refers to the catering of online services to match consumer's interests. In order to provide personalised service, companies gather data on the consumer. In this situation, consumers must navigate a trade-off when they want the benefits of personalised information and services while simultaneously wishing to protect themselves from privacy risks. However, despite many individuals claiming that privacy is an essential right to them, they behave contradictorily in online environments by not engaging in privacy-preserving behaviours. This paradox is known as the personalisation-privacy Paradox. The personalisation-privacy paradox has been studied in many different scenarios, ranging from location-based advertising to online shopping. The objective of this study is to investigate the personalisation-privacy paradox in the context of smart speakers. Based on an exploratory study with young Irish consumers, this study suggests a difference between the users and non-users of smart speakers in terms of their perception of privacy risks and corresponding privacy-preserving behaviours. In so doing, it also explains the existence of the personalisation-privacy paradox and offers insights for further research.

Track 6: Digital Social Enterprises & COVID-19: Enablers, Sustainability & Pathways

EXPLORING MULTI-DIMENSIONAL EVENTS CHARACTERIZING TECH START-UP EMERGENCE IN THE NIGERIAN ENTREPRENEURIAL ECOSYSTEM

Emanuel Okoro Ajah and Chidi Ononiwu

Most countries across the globe identify technology-based start-ups as a driving force for job creation, economic growth and national development, and a critical tool for economic sustenance during pandemic crises like covid-19. However, its emergence has been argued to be problematic. Especially in a developing economy like Nigeria, where tech start-up founders are faced with diverse forms of constraints and environmental uncertainties. Extant literature indicated that studies are being conducted to explain tech start-up emergence. However, such studies are fragmented with findings that are determinants to tech start-up emergence, with several determinants studied in isolation, and the emergence as linear and unidimensional events. Consequently, neglecting multi-dimensional perspective, which aggregate the dimensions of events characterizing tech start-up emergence. Given the iterative, event-based process, and interactive-dependent nature of tech start-up ventures to create activity-based products/services in an open, uncertain, nonlinear and dynamic environment, we argue that little is known about tech start-up emergence. Thus, by drawing from synthesize literature review, activity theory, and exploratory case study design we identify opportunity discovery and selection; team formation and domain consensus; bootstrapping; minimum viable product development and market experimentation feedback as interdependent multi-dimensional events constituting tech start-up emergence in Nigerian tech start-up ecosystem.

AN EXPLORATION OF FACTORS INFLUENCING THE ADOPTION OF ICT ENABLED ENTREPRENEURSHIP APPLICATIONS IN NAMIBIAN RURAL COMMUNITIES

Elizabeth Ujarura Kamutuezu, Heike Winschiers-Theophilus and Anicia Peters

Digital services have the potential to improve rural entrepreneurs' access to wider markets and increase their competitiveness among other benefits. Moreover, during the ongoing Covid-19 pandemic in which movement and physical contacts have been limited, businesses relied much on digital services. However, many Namibian rural entrepreneurs have not been able to use digital services to maintain their livelihood. Therefore, this study investigated the factors affecting the adoption of ICT enabled services by rural entrepreneurs. The study applied a cross-sectional survey of 77 respondents comprising 14 rural entrepreneurs and 63 rural community members from four sites. It was found that the five main factors affecting the adoption of digital services by rural entrepreneurs are a lack of awareness of digital services, electricity, skills to navigate smart devices, high cost of both devices and mobile internet and cybercrime. We recommend a tailor-made training program for rural entrepreneurs which includes raising awareness of digital services and associated benefits, capacity building on digital skills and best practice for cybersecurity. In addition, we propose that the Namibian Government should enhance digital inclusion through a policy initiative to reduce the cost to make both data and smart devices affordable for the poor and rural communities.

Track 7: Feminist and Queer approaches to Information Systems in Developing Countries

ASSESSING GENDER BIAS IN THE INFORMATION SYSTEMS FIELD: AN ANALYSIS OF THE IMPACT ON CITATIONS

Silvia Masiero and Aleksi Aaltonen

Gender bias, a systemic and unfair difference in how men and women are treated in a given domain, is widely studied across different academic fields. Yet, there are barely any studies of the phenomenon in the field of academic information systems (IS), which is surprising especially in the light of the proliferation of such studies in the Science, Technology, Mathematics and Technology (STEM) disciplines. To assess potential gender bias in the IS field, this paper outlines a study to estimate the impact of scholarly citations that female IS academics accumulate vis-à-vis their male colleagues. Drawing on a scientometric study of the 7,260 papers published in the most prestigious IS journals (known as the AIS Basket of Eight), our analysis aims to unveil potential bias in the accumulation of citations between genders in the field. We use panel regression to estimate the gendered citations accumulation in the field. By doing so we propose to contribute knowledge on a core dimension of gender bias in academia, which is, so far, almost completely unexplored in the IS field.

M-GOVERNMENT, WILAYA AND WOMEN'S EMPOWERMENT IN THE KINGDOM OF SAUDI ARABIA

Norah Humus Alotaibi, Salihu Dasuki and Efpraxia Zamani

With the loosening of the male guardianship system (Wilaya) in the Kingdom of Saudi Arabia (KSA), this study examines the contribution of m-government to the empowerment of Saudi women. We employ the key concepts of Sen's Capability Approach (CA) to understand how m-government services in the KSA have provided opportunities for women to become empowered. The findings of the study indicate that m-government contributes towards women's empowerment by providing opportunities to participate in social and economic activities. However, there are also key social and cultural factors that impede the use of m-government services for empowerment, and we found these to include religious beliefs, Saudi traditions and customs, and husbands' jealousy. The study makes some important contributions to theory and practice by being the first study to focus on the use that Saudi women make of the opportunities now available to them to access government services through m-government applications and to address the cultural barriers which may function to prevent their access.

WOMEN'S SOLIDARITY AND SOCIAL MEDIA: SISTERHOOD CONCEPT IN #LASRESPONDONAS, A FACEBOOK GROUP IN PERU

Juan Bossio and Illari Diez

Women in Peru are exposed daily to gender violence and exclusion. Several feminist groups have used social media to share information, debate, denounce, organize, and provide help to victims. This contribution analyzes the meaning of female solidarity, sisterhood or sororidad, as a feminist political concept among members of one feminist Facebook group. We reviewed the how various feminist and sisterhood concepts clustered together in the group communications by reviewing group publications and comments as far as interviewing key former and current members. The sisterhood concept was found to be central to feminist practice.

THE ETHICAL IMPLICATIONS OF DIGITAL CONTACT TRACING FOR LGBTQIA+ COMMUNITIES

Izak van Zyl and Nyx McLean

The onset of COVID-19 has led to the introduction of far-reaching digital interventions in the interest of public health. Among these, digital contact tracing has been proposed as a viable means of targeted control in countries across the globe, including on the African continent. This, in turn, creates significant ethical challenges for vulnerable communities, including LGBTQIA+ persons. In this research paper, we explore some of the ethical implications of digital contact tracing for the LGBTQIA+ community. We refer specifically to the digital infringement of freedoms, and ground our discussion in the discourse of data colonisation and Big Tech. We propose a critical intersectional feminism towards developing inclusive technology that is decentralised and user controlled. This approach is informed by a feminist ethics of care that emphasises multiple lived experiences.

FOR BETTER OR FOR WORSE? A FRAMEWORK FOR CRITICAL ANALYSIS OF ICT4D FOR WOMEN

Abhipsa Pal and Rahul De'

Diffusion of ICTs provide possibilities for women empowerment by greater participation and enhanced gender-based digital equality. However, a critical analysis reveals that as ICT diffusion widens, there is a persistent threat of widening the gender-based digital divide and exposes women to online sexual abuses, predominantly in developing countries characterized by the gendered nature of the social structure. Instead of accepting ICT as the facilitator to women empowerment, in this paper, we develop a critical research framework for a gender-focused examination of ICT4D studies. Critical research methodology provides the appropriate ontology unveiling social realities through challenging the status quo and exposing the deeper societal inequalities. Using the critical research framework developed, we investigate past ICT4D initiatives and artifacts from literature and draw critical conclusions of its benefits and issues. This study would aid future ICT4D research to investigate areas of gender discrimination and understand the role of ICTs in a critical light.

GENDER DATA 4 GIRLS?: A POSTCOLONIAL FEMINIST PARTICIPATORY STUDY IN BANGLADESH

Isobel Talks

Premised on the logic that more, high-quality information on majority world women's lives will improve the effectiveness of interventions addressing gender inequality, mainstream development institutions have invested heavily in gender data initiatives of late. However, critical empirical and theoretical investigations into gender data for development policy and practice are lacking. Postcolonial feminist theory has long provided a critical lens through which to analyse international development projects that target women in the majority world. However, postcolonial feminism remains underutilised for critically investigating data for development projects. This paper addresses these gaps through presenting the findings from a participatory action research project with young women involved in a gender data for development project in Bangladesh. Echoing postcolonial feminist concerns with development, the 'DataGirls' had some concerns that data was being extracted from their communities, representing the priorities of external NGOs to a greater extent than their own. However, through collaborating to develop and deliver community events on child marriage with the 'DataGirls', this research demonstrates that participatory approaches can address some postcolonial feminist criticisms of (data for)

development, by ensuring that gender data is enacted by and for majority world women rather than Western development institutions.

Track 8: Displacements, ICTs, and #NewNormal

KEY LESSONS LEARNED FROM WORKING DURING COVID-19 ON A PROJECT IN THE WORLD'S BIGGEST REFUGEE CAMP

Faheem Hussain and Suzana Brown

Using a case study structure, this research-in-progress paper elaborates the struggles of working on a humanitarian project during the Covid-19 period. The authors identify six specific challenges and propose innovations to address each of these challenges. The challenges are the following: supply chain, design of solutions, human resource development, connectivity, and user data collection. This unprecedented situation has been a testing ground for new innovative solutions for work in conflict zones.

THE LIBERALITIES AND TYRANNIES OF ICTS FOR VULNERABLE MIGRANTS: THE STATUS QUO, GAPS AND DIRECTIONS

Yidnekachew Redda Haile

Information and communication technologies (ICTs) have increasingly become vital for people on the move including the nearly 80 million displaced due to conflict, violence, and human right violations globally. However, existing research on ICTs and migrants, which almost entirely focused on migrants' ICT use 'en route' or within developed economies principally in the perspectives of researchers from these regions, is very fragmented posing a difficulty in understanding the key objects of research. Moreover, ICTs are often celebrated as liberating and exploitable at migrants' rational discretion even though they are 'double-edged swords' with significant risks, burdens, pressures and inequality challenges particularly for vulnerable migrants including those forcefully displaced and trafficked. Towards addressing these limitations and illuminating future directions, this paper, first, scrutinises the existing research vis-à-vis ICTs' liberating and authoritarian role particularly for vulnerable migrants whereby explicating key issues in the research domain. Second, it identifies key gaps and opportunities for future research. Using a tailored methodology, broad literature relating to ICTs and migration/development published in the period 1990-2020 was surveyed resulting in 157 selected publications which were critically appraised vis-à-vis the key themes, major technologies dealt with, and methodologies and theories/concepts adopted. Furthermore, key insights, trends, gaps, and future research opportunities pertaining to both the existing and missing objects of research in ICTs and migration/development are spotlighted.

INFORMATION SOURCES AND ANXIETY AMONG REFUGEES IN KENYA DURING COVID-19

Matthew A. McGee, Carleen Maitland and Dorothy Njoroge

In the COVID-19 pandemic, refugees' access to information has become increasingly important given the rapid change in the scientific and public health knowledge-base. However, this access is complicated by social distancing requirements that disrupt traditional in-person communication. Many refugees must then rely on alternative information sources to stay informed. Differences in media types and information sources in turn may be related to anxieties arising from the virus and perceptions of others' adherence to recommended protective behaviors. We examine these relationships with survey data from 1,000 refugees living in both camps and non-camp settings in Kenya. Using logit models, we test relationships between information source and anxiety and the effect of these variables on refugees' expected behaviors of community members. Our primary

contributions include the finding that information sources consistently exacerbate (e.g., Facebook) or ameliorate (e.g., news from the internet) different anxieties, or can have mixed effects (e.g., radio). We also find that anxiety and information have significant impacts on refugees' expectations of compliance by others and that, whether between camps or between camps and non-camp locales, findings vary by location. Our results have implications for refugee media and infectious disease anxiety scholarship as well as for managing infectious disease response.

Track 9: Digital Authoritarianism and Fundamentalism: Problems and Solutions

THE QUEST FOR DEVELOPMENT: WHEN SOCIAL MEDIA-BROKERED POLITICAL POWER ENCOUNTERS POLITICAL ‘FLAK JACKETS’

Boluwatife Ajibola

Social media provides an extended space for collective action, as netizens leverage it as a tool for claim-making and for demanding the dividends of governance. However, political regimes often greet expanding use of social media with censorship, which netizens often have to contend with, particularly in the quest for development outcomes. While existing studies have expansively explored multiple uses of social media, the specific features that signal their massive uptake and how this intersects with the quest for political power has not been substantially documented. This paper argues that social media is characterized by social buttons that expedite the multiplication of ‘digital bullets’ – in forms of tweets and perceived detestable comments – which compromise the defense lines of political regimes, hence, their uptake of censorship as metaphorical ‘flak jackets’. This research is conducted on the basis of key informant interviews with voices against social media censorship in Nigeria since the inception of Nigeria’s ruling government in 2015, particularly following the proposed ‘Protection from Internet Falsehood and Manipulations Bill’ in 2019.

Track 10: The Role of ICT in Achieving Social Justice (ICT4SJ)

EHEALTH TECHNOLOGIES INTEGRATION WITH HEALTHCARE WORK ACTIVITIES IN PUBLIC HOSPITALS IN SOUTH AFRICA: A CRITICAL REALIST PERSPECTIVE

Mourine Achieng and Ephias Ruhode

Integration of eHealth technologies with healthcare work activities has seen great advancement in many healthcare systems in developing countries. However, these efforts have been tainted by several challenges such as fragmentation, lack of standardization and co-ordination. Subsequently, the undertakings of eHealth articulated in health strategy/policy documents have not been fully realised. The implications of this has been that the majority of the population still access inadequate healthcare services. The aim of this paper is to explain why the current integration efforts do not adequately facilitate healthcare work activities in public hospitals in under-served contexts of South Africa. A critical realist perspective within a qualitative approach was adopted. A total of 21 participants were purposively sampled and interviewed because of their knowledge and experience in the healthcare service delivery process as well as their involvement in the integration of ehealth. The study applied the Activity Analysis and Development (ActAD) model as a theoretical analytical tool and draws on normalization process theory (NPT) as an explanatory framework. The findings highlight generative mechanisms such as the inadequate analysis of system's fit-for-purpose in healthcare workflows have inhibiting effects in the integration process of eHealth.

POWER PARTICIPATION IN DIGITAL CITIZEN ENGAGEMENT IN SOUTH AFRICAN LOCAL GOVERNMENT: THE CASE OF MOBISAM

Caroline Khene, Ingrid Siebörger, Mamello Thinyane and Clement Simuja

A lack of service delivery and accountability are two characteristic challenges of numerous municipalities (local government) in South Africa. MobiSAM was introduced as a collaborative effort between a local university, civil society, residents, and local government to grow digital citizen engagement, facilitate two-way communication between local government and its citizenry, and contribute to the improved provision of basic services. Through the course of the project, it became clear that power, with respect to knowledge, was at play in the interactions or lack thereof between local government and citizens. This work-in-progress paper begins the journey of exploration of the power/knowledge dynamics at play in the MobiSAM project (using the SECI model and the Power Cube) by unpacking and understanding the nature of knowledge processed in the project and the associated knowledge creation processes that ensued between the different project stakeholders over time. The influence of power in determining the effective transfer of knowledge between key stakeholders of the project, for capacity building and organisational learning has emerged as an important issue in need of thorough investigation and critical analysis. This work in progress paper presents the preliminary framing of the research findings on the phases associated with the interplay of knowledge and power in the MobiSAM project, which are: 1) Realisation, 2) Navigating Responsiveness, and 3) Emergence.

SURVEY OF CYBER VIOLENCE AGAINST WOMEN IN MALAWI

Donald Flywell Malanga

The purpose of this study was to investigate the prevalence of cyber violence against women in Karonga district of Malawi. The study adopted a descriptive survey design. About 67 women participated in the survey questionnaire. The study utilised Technology Facilitated Gender-Based

Violence Framework as theoretical lens. The study noted that women experienced various forms of cyber violence such as cyber bullying, cyber harassment, online defamation, cyberstalking, sexual exploitation, online hate speech, and revenge pornography. Perpetrators used digital platforms such Facebook, WhatsApp, online personal accounts, dating sites, and smartphones to carry out their evil acts. The study also found that perpetrators' motivations were driven by revenge, anger, jealousy, sexual desire and political agenda, with the intentions to harm the victims socially, psychologically, economically, and physically. The women used coping measures such as confrontation and blocking the perpetrator or by leaving the online platform. It was found that women never bothered to report the incidences to the police or community to seek for support due to lack of awareness, cultural and patriarchal factors. In conclusion, the study found that the prevalence of cyber violence against women is rising significantly in Malawi. Therefore, the findings provide insights to policy makers and research practitioners on how to implement strategies for combating cyber violence against women in the country.

Track 11: Potential and risks of advanced technologies in the Global South

COMMUNICATION IS THE UNIVERSAL SOLVENT: ATREYA BOT - AN INTERACTIVE BOT FOR CHEMICAL SCIENTISTS

Mahak Sharma, Abhishek Kaushik, Rajesh Kumar, Sushant Kumar Rai, Harshada Hanumant Desai and Sargam Yadav

Conversational agents are a recent trend in human-computer interaction, deployed in multi-disciplinary applications to assist the users. In this paper, we introduce "Atreya", an interactive bot for chemistry enthusiasts, researchers, and students to study the ChEMBL database. Atreya is hosted by Telegram, a popular cloud-based instant messaging application. This user-friendly bot queries the ChEMBL database, retrieves the drug details for a particular disease, targets associated with that drug, etc. This paper explores the potential of using a conversational agent to assist chemistry students and chemical scientist in complex information seeking process.

ARTIFICIAL INTELLIGENCE ETHICS: AN INCLUSIVE GLOBAL DISCOURSE?

Cathy Roche, Dave Lewis and P.J. Wall

It is widely accepted that technology is ubiquitous across the planet and has the potential to solve many of the problems existing in the Global South. Moreover, the rapid advancement of artificial intelligence (AI) brings with it the potential to address many of the challenges outlined in the Sustainable Development Goals (SDGs) in ways which were never before possible. However, there are many questions about how such advanced technologies should be managed and governed, and whether or not the emerging ethical frameworks and standards for AI are dominated by the Global North. This research examines the growing body of documentation on AI ethics to examine whether or not there is equality of participation in the ongoing global discourse. Specifically, it seeks to discover if both countries in the Global South and women are underrepresented in this discourse. Findings indicate a dearth of references to both of these themes in the AI ethics documents, suggesting that the associated ethical implications and risks are being neglected. Without adequate input from both countries in the Global South and from women, such ethical frameworks and standards may be discriminatory with the potential to reinforce marginalisation.

SMART CITIES: POTENTIALITIES AND CHALLENGES IN A CONTEXT OF SHARING ECONOMY

Ben Hur Monteiro Barizon and Renata Lèbre La Rovere

The purpose of the present paper is to show how blockchain and IoT technologies can benefit smart city projects, which tend to spread in the context of the sharing economy. The article also aims to describe the challenges and potentialities of smart city projects. It was found that technology platforms can serve as a strategy to build the basis for product development (goods and services) and technology-based innovation.

FACTORS THAT DETERMINE CONTINUOUS INTENTION TO USE MOBILE PAYMENTS IN MALAWI

Jones Ntaukira, Priscilla Maliwichi and James Kamwachale Khomba

The proliferation of mobile phones has made mobile payments to be widely used in developing economies. However, mobile payment usage in Malawi is low, and there are many limitations to

encourage users to continuously use mobile payments. The purpose of this research was to examine determinants of continuous intention to use mobile payments in Malawi. A conceptual framework adapted from Technology Acceptance Model was developed. Data was collected through a survey while data analysis used Structural Equation Modelling Partial Least Squares using SmartPLS software. The findings of this study showed that society norms significantly influence continuous intention to use mobile payments ($p=0.012$). Most interestingly, prior knowledge ($p=0.000$) and seamlessness ($p=0.000$) had the strongest influence as compared to structural assurance ($p=0.008$). Seamlessness significantly influenced satisfaction ($p=0.002$) and society norms ($p=0.001$). Seamlessness and service quality had significantly negative effects on satisfaction. The findings of this research provide several considerations to guide the mobile payments industry in Malawi. The findings may also improve the existing mobile payments system's business models, marketing strategies, customer engagement on security issues, transparency, and interoperability of payment systems. Regulators may also find the findings of this study very insightful in advancing the mobile payments agenda in Malawi.

Track 12: Digitalization for Indigenous Emancipation

“SHARING WISDOMS FROM THE EAST”: DEVELOPING A NATIVE THEORY OF ICT4D USING GROUNDED THEORY METHODOLOGY (GTM) - EXPERIENCE FROM TIMOR-LESTE

Abel Pires da Silva

There have been repeated calls made for theory-building studies in ICT4D research to solidify the existence of this research field. However, theory-building studies are not yet common, even though ICT4D as a research domain is a promising venue to develop native and indigenous theories. To this end, this paper outlines a theory-building study in ICT4D, based on the author's experience in developing a mid-range theory called 'Cultivating-Sustainability' of E-government projects, a native mid-range theory of ICT4D. The paper synthesizes the GTM literature and provides a step-by-step illustration of GTM use in practice for research students and early career ICT4D academics. It introduces the key strategies and principles of GTM, such as the theoretical sampling strategy, the constant comparison strategy, the concept-emergent principle, and the use of literature throughout the study process. Then discusses the steps involved in the data collection and analysis process to develop a theory using case studies as sources of empirical data; it concludes with a discussion on using the strategies and principles in the three case studies. It is expected that this paper contributes to the diversification of research methodology, particularly to our collective quest for developing native and indigenous theories in the ICT4D research domain.

TOWARDS A RESILIENT INFORMATION SYSTEM FOR AGRICULTURE EXTENSION INFORMATION SYSTEM: AN EXPLORATORY STUDY

Muluneh Atinaf, Alemayehu Molla and Salehu Anteneh

Although digital technologies are contributing to human development, several information systems (IS) interventions for development especially in developing countries do not perform as expected nor deliver anticipated outcomes at scale. This raises questions about how to develop and enhance resilient IS for development, an area that requires more research attention. A sound and systematic understanding of the mechanisms local communities apply to maintain resilience and the key transformation areas for a resilient IS development will help to improve the situation. This study addresses how stakeholders can ensure resilient information provision within the Agricultural Extension Information Service (AEIS) and identifies the challenges in designing resilient IS. Conceptually, the study draws from the IS resilience framework. Empirically, it draws from interview data collected from the AEIS provision practice in Ethiopia. The findings show the robustness, self-organization, learning, redundancy, rapidity, scale, diversity and equality mechanisms, the challenges and the key transformations required to advance the resilience of IS for AEIS. The study contributes to the conversation on the application of the IS resilience framework in analyzing local information provision practices as well as to practice highlighting the key transformation areas to improve the effectiveness and impact of AEIS.

APPROPRIATION, COLONIALITY, AND DIGITAL TECHNOLOGIES. OBSERVATIONS FROM WITHIN AN AFRICAN PLACE

Gertjan van Stam

This paper provides an assessment of experiences and understanding of digital technologies from within an African place. It provides philosophical reflections upon the introduction and existence – appropriation – of digital technologies. Digital technologies are inherently linked to a

colonialising power and, in general, unaligned with local, African ways of *knowing*. Imported technologies are set in modern, universalised doing and unsensitive to the importance of aligned being in African contexts. Sensitivities, it is argued, can be fostered by a decolonial turn, where focus shifts from *the individual to the community*.

THE ICT-BUEN VIVIR PARADOX: USING DIGITAL TOOLS TO DEFEND INDIGENOUS CULTURES

Lorena Pérez-García

Arguably shaped by political economy perspectives from the Global North, ICT4D aims to reduce socioeconomic disparities across countries and regions through ICT implementations, as well as to open up opportunities for empowerment and human development. Despite these aims, ICT4D has been criticized because 1) although ICT and internet have positive effects on societies across the Global North, their positive impact on people's lives in the Global South cannot be easily proved; 2) ICT4D's primary focus seems to be on ICT's series of artefacts rather than on ICT's positive transformative potential of living conditions in the world; 3) the type of development ICT4D aims for could mask global hegemonic interests and seek neoliberal restructuring within less socioeconomically favoured communities within the Global South. For these reasons, claim scholars, ICT4D should be revised. By presenting ICT appropriations among Wixárika peoples in Mexico to protect their sacred land, this paper aims to 1) shed a light on the need for postcolonial critical frameworks on what 'development' associated with ICT should be and 2) to foster discussions on whether ICT can enable alternative voices from the Global South to be heard, despite tensions between traditional views and contemporary technologies.

Track 14: General Track

THE MODERATING EFFECT OF GENDER ON ADOPTING DIGITAL GOVERNMENT INNOVATIONS IN ETHIOPIA

Debas Senshaw and Hossana Twinomurinzi

Digital government innovation is being recognised as a solution to many problems faced by governments in providing services to their citizens. It is especially important for low-income countries where there are resource constraints. This research was aimed at exploring the moderating effect of gender on the adoption of a digital government innovation in Ethiopia based on the UTAUT model (n=270) and using structural equation modeling (SEM). The results reveal that gender only moderates the relationship between facilitating conditions and usage behavior of government employees to adopt the digital government innovation which is inconsistent with other findings. Another key finding was that even though the innovation was regarded as not being easy to use, women identified that they would still use it because of the social influence from the peers and the bosses. This finding suggests that women government employees who obtain external support are more likely to use digital government innovations compared with men who are unlikely to use it even if they were facilitated. The paper recommends that governments of low-income countries like Ethiopia should design appropriate policies that encourage women in digital government.

PATTERNS OF ICT USAGE IN DISASTER IN SAMOA

Ioana Chan Mow, Agnes Wong Soon, Elisapeta Maua'i and Ainsley Anesone

The study discussed in this paper focuses on ICT use during disasters in Samoa and is a replicate of a study carried out in 2015. The study used a survey to explore how Samoan citizens use technology, act on different types of information, and how the information source or media affects decisions to act during a disaster. Findings revealed that traditional broadcasting were still the most prominent, most important, and still predominate in early warning and disaster response. However, there were now increasing usage of mobile and social media in disaster communications. Findings also revealed that people trust official reporters the most as source of information in times of crisis. The intent is that findings from this study can contribute to a people-centred approach to early warning and disaster providing empowerment to affected individuals to act in a timely and appropriate manner to ensure survival in times of disaster.

FROM DIGITAL DIVIDE TO DIGITAL JUSTICE IN THE GLOBAL SOUTH: CONCEPTUALISING ADVERSE DIGITAL INCORPORATION

Richard Heeks

The connection between digital and inequality has traditionally been understood in terms of the digital divide or of forms of digital inequality whose core conceptualisation is exclusion. This paper argues that, as the global South moves into a digital development paradigm of growing breadth and depth of digital engagement, an exclusion worldview is no longer sufficient. Drawing from ideas in the development studies literature on chronic poverty, the paper argues the need for a new concept: “adverse digital incorporation”, meaning inclusion in a digital system that enables a more-advantaged group to extract disproportionate value from the work or resources of another, less-advantaged group. This explains why inequality persists – even grows – in a digital development paradigm. To help ground future research and practice on this issue, the paper inductively builds a conceptual model of adverse digital incorporation with three main component sets: the processes, the drivers, and the causes of adverse digital incorporation. The paper

concludes with thoughts on a future research and practice agenda that seeks to deliver digital justice in the global South: a necessary reconfiguration of the broader components of power that currently shape the inclusionary connection between digital and inequality.

THE COMMODIFICATION OF OPEN EDUCATIONAL RESOURCES FOR TEACHING AND LEARNING BY ACADEMICS IN AN OPEN DISTANCE E-LEARNING INSTITUTION

Lancelord Siphamandla Mncube, Maureen Tanner and Wallace Chigona

The use of open educational resources (OER) is gaining momentum in higher education institutions. This study sought to establish academics' perceptions and knowledge of OER for teaching and learning in an open distance e-learning (ODEL) university. The study also sought to establish how perceptions are formed. The inductive approach followed the lens of commodification to answer the research questions. The commodification phase allowed for a better understanding of the academics' prior knowledge, informers, academics behaviour about OER, and how they perceived OER to be useful for teaching and learning. The study employed a qualitative method, with semi-structured interviews to collect data. The study found that academics with prior experience and knowledge of OER are more successful in the use of these resources for teaching, learning, and research. OER is also perceived as a useful tool to promote African knowledge, showcase the contributions of African academics, improve academic research capabilities, improve student's success rate, particularly for financially vulnerable students. Based on the acquired perceptions, the study able to propose a new guideline to formulate user perceptions. However, this can only be achieved through a solid OER policy with the support of government and tertiary institution top management. The findings may inform higher education institutions when they consider the development of OER strategies and policies, especially in response to the Covid-19 emergency online learning transition.

BIG DATA ANALYTICS IN HUMANITARIAN AND DISASTER OPERATIONS: A SYSTEMATIC REVIEW

Abhilash Kondraganti

By the outset of this review, 168 million people needed humanitarian aid, and the number grew to 235 million by the end of the completion of this review. There is no time to lose, definitely no data to lose. Humanitarian relief is crucial not just to contend with a pandemic once a century but also to provide help during civil conflicts, ever-increasing natural disasters, and other forms of crisis. Reliance on technology has never been so relevant and critical than now. The creation of more data and advancements in data analytics provides an opportunity to the humanitarian field. This review aimed at providing a holistic understanding of big data analytics in a humanitarian and disaster setting. A systematic literature review method is used to examine the field and the results of this review explain research gaps, and opportunities available for future research. This study has shown a significant research imbalance in the disaster phase, highlighting how the emphasis is on responsive measures than preventive measures. Such reactionary measures would only exacerbate the disaster, as is the case in many nations with COVID-19. Overall this research details the current state of big data analytics in a humanitarian and disaster setting.

IMPACT OF CULTURE ON THE ADOPTION OF DIABETES SELF-MANAGEMENT APPLICATIONS: CAPE FLATS, SOUTH AFRICA

Fazlyn Petersen

Diabetes is a global health problem with a high mortality rate. The research indicates low levels of technology use amongst diabetic patients in low socioeconomic environments and minority

groups. We posit that the culture of patients is a potential reason for the low adoption and use of technology. However, research on the proliferation of culture at an individual level is limited. Therefore, this paper assessed the influence of culture on mobile application adoption and use amongst diabetic patients in the Cape Flats, South Africa. This study used key constructs from the Theory of Planned Behaviour (TPB) and Hofstede's cultural dimensions. It was analysed using survey data from 439 respondents using purposive sampling. It was found that the dimensions of Hofstede and the Theory of Planned Behaviour can identify how culture influences mobile application adoption of diabetic patients in the geographical Cape Flats area. However, this research indicates a stronger relationship between culture and diabetes self-management activities than culture and the adoption of mobile applications.

GLOBAL TRANSFERS: M-PESA, INTELLECTUAL PROPERTY RIGHTS AND DIGITAL INNOVATION

Christopher Foster

In July 2020, in the midst of the COVID crisis, the Kenyan mobile operator Safaricom announced that the intellectual property rights (IPR) for mobile money service M-Pesa were “moving back into African control”. This paper tracks how the IPR originally came to be held outside Kenya, and the implications for understanding M-Pesa as an inclusive innovation. Through reflection of this analysis of IPR and innovation, the paper contributes to discussions on structural aspects of digital innovation in the global south. By focussing on IPR, it unpacks some of the processes by which global intellectual property regimes and cross-border IPR practices shape uneven outcomes and power.

CONCEPTUALISING HEALTHCARE-SEEKING AS AN ACTIVITY TO EXPLAIN TECHNOLOGY USE - A CASE OF M-HEALTH

Karen Sowon and Wallace Chigona

The purpose of this paper is to engage with the Information Systems' contexts of use as a means to explain nuanced human-technology interaction. In this paper, we specifically propose the conceptualisation of healthcare-seeking as an activity to offer a richer explanation of technology utilisation. This is an interpretivist study drawing on Activity Theory to conceptualise healthcare-seeking as the minimum context needed to explicate use. A framework of the core aspects of AT is used to analyse one empirical mHealth case from a Kenyan context thus illustrating how AT can be applied to study technology use. The paper explicates technology use by explaining various utilisation behaviour that may emerge in a complex human-technology interaction context; ranging from a complex adoption process to mechanisms to determine continuance that differentiate trust in the intervention from trust in the information, and potential technology coping strategies. The paper is a novel attempt to operationalise AT to study technology use. It thus offers a broader explication of use while providing insights for design and implementation made possible by the conceptualisation of healthcare-seeking as an activity. Such insights may be useful in the design of patient-centred systems.

FRAMEWORK FOR MANAGING CYBERCRIME RISKS IN NIGERIAN UNIVERSITIES

Bukhari Badamasi and Samuel C. Avemaria Utulu

Universities in developing countries, including those in Nigeria, experience cybercrime risks due to poor management of their cyber spaces and resources. The outcome of these cybercrimes are threats and breaches of universities' cyber security. The threats and breaches have resulted in substantial financial, social, and intellectual property losses. In the recent past, Nigerian

universities have started to respond to these cyber-attacks. Many of them now invest in anti-cybercrime tools and programs to mitigate cyber security threats and breaches. Despite this, the number of times Nigerian universities suffer from cyber-attacks and the losses that result from them keeps increasing. Our observation, however, indicates that most Nigerian universities run their cyber security without using scientifically derived frameworks that spell out how to manage threats and breaches that emanate from within and outside them. We consider this a problem to ongoing efforts made by Nigerian universities to mitigate cyber security threats and breaches. The study reported in this paper was therefore, carried out to explicate how Nigerian universities can develop actionable frameworks that can help them to mitigate cyber security threats and breaches. The study is based on literature review and proposes how an actionable framework that Nigerian Universities can adopt to setoff cybersecurity programs can be developed. The process comprises problem identification, description of objectives, designing and developing the artefact, testing, and evaluating the artefact, and communicating the result. We conclude that the framework provides a lucrative starting point for Nigerian universities to set off efficient and effective cyber security programs.

DIGITALISING THE WATER SECTOR: IMPLICATIONS FOR WATER SERVICE MANAGEMENT AND GOVERNANCE

Godfred Amankwaa, Richard Heeks and Alison L Browne

Digital technologies are becoming central to water governance and management, yet their impact and developmental implications are under-researched, particularly in the global South. This paper addresses this knowledge gap by examining the process of water service digitalisation and the resulting effects on service providers. Drawing on qualitative methods, we apply ideas on digitalisation, value, and power to investigate the implementation and impact of digital technologies in Ghana's state water utility company. We find digital water innovations to be recent, and delivering relatively limited impacts as yet, with value mainly accruing at the utility's operational rather than strategic level. The digital technologies present avenues for power shifts and struggles internally and externally as well as some changes in water management structures and responsibilities. We end with a brief discussion on the implications for water service governance and research.

ICT USE AND LIVELIHOODS OF WOMEN MICROENTERPRISES IN MALAWI

Donald Flywell Malanga and Memory Banda

This study aimed to assess the impacts of ICTs on livelihoods of women microenterprises in Malawi. The study was an interpretive qualitative approach in which semi-structured interviews, observation and field notes were used to collect data. About 25 women involved in various microenterprises in three rural areas of Karonga district in Malawi were purposively selected to participate in the study. The framework for the study was based on Serrat's sustainable livelihood approach. The study noted that the use of ICTs potentially enabled women microenterprises to build their financial, human, social, and informational capital assets. The study found that ICTs to some extent contributed to the livelihoods of women microenterprises such as improved access to information; diversification of business opportunities, improved communication, improved marketing, and reduced transport costs. As a result, this led to sustainable use of resources, improved well-being, and empowerment for women. However, unreliable electricity; lack of affordable ICT devices; lack of awareness to utilise ICTs in businesses and lack of ICT literacy skills were major concerns that affected women microenterprises. The study offers insights to research practioners, policy makers and other stakeholders on the role of ICTs in fostering women microentrepreneurship in rural communities of Malawi.

DIGITAL GLOBAL PUBLIC GOODS

Johan Ivar Sæbø, Brian Nicholson, Sundeep Sahay and Petter Nielsen

The purpose of this paper is to define and conceptualize digital global public goods (DGPGs) and illustrate the importance of contextual relevance in ICT4D projects. Recent studies have examined the importance of digital artefacts with public goods traits, emphasizing the significant potential for socio-economic development. However, we know little about the theoretical and practical dimensions of how we can align the public goods traits of such artefacts to create relevance in the context they are implemented. To address this gap we review the literature firstly to develop a definition and conceptual basis of DGPGs and then to illustrate the importance of relevance: how to align DGPGs with context to meet local needs. The illustration draws from a case study of the District Health Information systems (DHIS2). The paper advances both the theoretical and practical understanding of DPGs in development processes.

BUILDING AGILITY IN COVID-19 INFORMATION SYSTEMS RESPONSE IN SRI LANKA: RECOMMENDATIONS FOR PRACTICE

Pamod Amarakoon, Jørn Braa and Sundeep Sahay

COVID-19 pandemic tested the capacity of information systems in countries on the ability to rapidly respond to requirements which were not anticipated. This article analyzes the socio-technical determinants of agility in building the IS response to the COVID-19 pandemic in Sri Lanka. We deploy qualitative research methods to explore the case study of implementation of COVID-19 surveillance system in Sri Lanka. Three key recommendations are developed for practice relating to high-level multisectoral governance, use of lightweight digital platforms and leveraging on existing capacities and infrastructure.

HOLISTICALLY PLACING THE ICT ARTEFACT IN CAPABILITY APPROACH

Mathew Masinde Egessa and Samuel Liyala

This paper proposes a framework that holistically places the Information and Communication Technology (ICT) Artefact in Capability Approach (CA). The framework harmonises the different conceptualisations of technology within CA-based frameworks in ICT4D, in order to address the inconsistencies. To illustrate the framework, while simultaneously addressing the highest thematic research gap among post-2015 ICT4D research priorities, the study collected primary data from users of Pay-As-You-Go (PAYGO) Solar Home Systems who reside in rural Kenya. Using the framework, the study revealed that the ICT-artefact can holistically be conceptualised within three of CA's concepts: under material resources as a capability input; as a new category of conversion factors (technological conversion factors); and as a component within the structural context. The study further demonstrated how the same ICT artefact could play out in the three different conceptualisations, resulting in different development outcomes for individuals. The study finally presents the implications for policy and practice.

LEGITIMIZATION OF DATA QUALITY PRACTICES IN HEALTH MANAGEMENT INFORMATION SYSTEMS USING DHIS2. CASE OF MALAWI

Martin Bright Msendma, Wallace Chigona, Benjamin Kumwenda, Jens Kaasbøll and Chipso Kanjo

Medical doctors consider data quality management a secondary priority when delivering health care. Medical practitioners find data quality management practices intrusive to their operations. Using the Health Management Information System (HMIS) that uses the DHIS2 platform, our qualitative case study establishes that isomorphism leads to legitimization of data quality management practices among health practitioners and subsequently data quality. This case study employed the methods of observation, semi structured interviews and review of artefacts to explore how through isomorphic processes data quality management practices are legitimized among the stakeholders. Data was collected from Ministry of Health's (Malawi) HMIS Technical Working Group members in Lilongwe and from medical practitioners and data clerks in Thyolo district. From the findings we noted that mimetic isomorphism led to moral and pragmatic legitimacy while normative isomorphism led to cognitive legitimacy within the HMIS structure and helped to attain correctness and timeliness of the data and reports respectively. Through this understanding we firstly contribute to literature on organizational issues in IS research. Secondly, we contribute to practice as we motivate health service managers to capitalize on isomorphic forces to help legitimization of data quality management practices among health practitioners.

A PROPOSED FRAMEWORK FOR THE COMPREHENSIVE SCALABILITY ASSESSMENT OF ICTD PROJECTS

Gugulethu Baduza and Caroline Khene

The scalability of ICTD projects is an imperative topic that has been neglected in the field. Little has been written or investigated about the assessment of the scalability of ICTD projects due to factors, such as the lack of proven business models for success, the high failure rate of projects, undefined aspects of assessment, and the small number of projects that have scaled. Therefore, there are various factors that should be taken into consideration to alleviate the challenges experienced in the process of scaling up. This research study is guided by an investigation into how can the scalability of an ICTD project be assessed using a comprehensive evaluation approach that considers the impact and potential sustainability of the project. This research study proposes a Comprehensive Scalability Assessment Framework (CSAF), using systems theory and amplification theory to guide the theoretical analysis and empirical investigation. A theorizing approach is used to develop the framework, which is structured around three components: *assessment guidelines and proceeding domains of evaluation; four scalability themes (stakeholder composition, models feasibility, resources sustainability and resilience) and judge scalability.*

MOMENTS IN THE PRODUCTION OF SPACE: DEVELOPING A GENERIC ADOLESCENT GIRLS AND YOUNG WOMEN HEALTH INFORMATION SYSTEMS IN ZIMBABWE

Rangarirai Matavire, Jørn Braa, Shorai Huwa, Lameck Munangaidzwa, Zeferino Saugene, Isaac Taramusi and Bob Jolliffe

With global targets to end AIDS by 2030 and to eliminate new HIV infections, Adolescent Girls and Young Women (AGYW) are seen to be particularly vulnerable, especially in Sub Saharan Africa. Numerous nations have therefore rolled out interventions to provide services to remove the determinants of vulnerability, such as limited education, early marriage, poverty, domestic violence, and exposure by male partners. Within this context, subpopulations such as sex workers increase the vulnerability amongst AGYW and are also supported through prevention programming. This study follows a project to develop a generic health information systems solution to provide a means to monitor and evaluate the successes of the AGYW initiative in reducing new infections. It borrows theoretical ideas from Henri Lefebvre's theory of moments to describe the process in which the space for the development of the solution is produced.

DECONSTRUCTING THE DICHOTOMOUS RELATIONSHIP BETWEEN INFORMATION SYSTEM PROFESSIONALS AND END-USERS: A CASE OF IMPLEMENTING STANDARD HEALTH INDICATORS IN CAMEROON

Flora Asah and Jens Kaasbøll

Différance and *supplément* are post-structuralist concepts for analyzing language in text and are most often associated with the work of Jacques Derrida. The findings after the implementation of standard health indicators in Cameroon show that staff at the peripheral level encounter multiple challenges, including lack of participation during the implementation process, and tension between staff at the peripheral level and IT staff at the central level, which result in non-use of the system. We use deconstruction to understand the root cause and the findings reveal that IT professionals and end-users are embedded in a relation of domination. That is, IT professionals are *différance* from end-users and end-users are *supplément* of IT professionals. Although end-users are portrayed as supplementary, they are supposed to manage the system, which is contradictory. This led to IT professionals having more privilege and authority over end-users. This dichotomous relation is a derivative of the organizational structure. The notion of portraying IT professionals in charge and having more authority over end-users is an avenue for conflict. The paper concludes that a HIS organizational structure where decision-making is centralized is a ground for conflict and a major roadblock of building local capacity and providing infrastructural support at the peripheral.

ARTIFICIAL INTELLIGENCE IN THE GLOBAL SOUTH: POTENTIAL AND RISKS

P.J. Wall, Deepak Saxena and Suzana Brown

Artificial intelligence is becoming more widely available in all parts of the world. This has created many previously unforeseen possibilities for addressing the challenges outlined in the Sustainable Development Goals in the Global South. However, the use of AI in such contexts brings with it a unique set of risks and challenges. Among these are the potential for Governments to use such technologies to suppress their own people, and the ethical questions arising from implementing AI primarily designed and developed in the Global North into vastly different social, cultural, and political environments in the Global South. This paper examines the key issues and questions arising in the emerging sub-field of AI for global development (AI4D) and the potential and risks associated with using such technologies in the Global South. We propose that although there are many risks associated with the use of AI, the potential benefits are enough to warrant detailed research and investigation of the most appropriate and effective ways to design, develop, implement, and use such technologies in the Global South. We conclude by calling for the wider ICT4D community to continue to conduct detailed research and investigation of all aspects of AI4D.

EMPIRICAL STUDY OF SUSTAINING THE ACTUALIZED VALUE PROPOSITIONS OF IMPLEMENTED E-GOVERNMENT PROJECTS IN SUB-SAHARAN AFRICA

Yusuf Ephraim Chidama and Chidi Gerard Ononiwu

Governments in sub-Saharan Africa have implemented e-Government projects. Actualizing the value propositions and sustaining such values are becoming problematic. Some scanty studies on the value propositions of implemented e-Government projects did not consider actualization of the values. Besides, such studies lack theoretical underpinnings, the identification, and measure of what constitutes actualized values. Neither did they capture what mechanisms could sustain the actualized values nor the contextual conditions enabling its sustainability. Consequently, using a concept-centric systematic review, we identified the value proposition of such implemented projects. By drawing from theories of affordance actualization, realist evaluation (RE) theory, self-

determination theory, and sustainability framework for e-Government success. We conducted a RE of the implemented e-Government projects in Rwanda using RE as a methodology in three phases. In phase one, we developed the initial program theory (IPT), in phase two, we used contingent valuation as a quantitative approach and realist interview as a qualitative method to validate the IPT. Lastly, in the third phase, we synthesized the results of the two investigative case studies to develop the actualized values sustainability framework. Such framework encapsulates the actualized value propositions, mechanisms and enabling conditions in interactions to sustain the value propositions discovered in the e-Government investigative contexts.

SUSTAINABLE DEVELOPMENT THROUGH A MOBILE APPLICATION FOR A COMMUNITY CLINIC

Martina A. Clarke, Sajda Qureshi, Timi Barone and John R. Windle

Implementing Information and Communication Technology (ICT) solutions can alleviate pressing problems in society and are a central component of sustainable development. Often, healthcare addresses the symptoms without approaching the socioeconomic limiters that can lead to reduced individual economic freedoms from receiving healthcare. This paper investigates the question: How can technology and training interventions enable clinicians to offer care that addresses the socioeconomic limitations of their patients? This paper observes the implementation of a mobile app designed to offer people who cannot access health resources in Omaha, Nebraska, a city in the Midwestern United States. This study follows the design science and action research approach, with clinicians participating in developing the mobile app. As a result of COVID, patients no longer have access to the free clinic because it was shut down. The app is available to the broader community needing basic resources to stay healthy. Through sets of application revisions and observations of usage, this paper arrives at insights into how such applications can support multi-ethnic and underserved communities. The contribution of this paper is to provide contextually specific and rich descriptions of how to implement sustainable ICT solutions to meet the information needs of patients in underserved communities.

READINESS OF THE SOUTH AFRICAN AGRICULTURAL SECTOR TO IMPLEMENT IOT

In'aam Soeker, Shallen Lusinga and Wallace Chigona

As the world's population increases, so does the demand for food. This demand for food in turn puts pressure on agriculture in many countries. The impact of climate change on the environment has made it difficult to produce food that may be necessary to accommodate the growing population. Due to these concerns, the agriculture sector is forced to move towards more efficient and sustainable methods of farming to increase productivity. There is evidence that the use of technology in agriculture has the potential to improve food production and food sustainability; thereby addressing the concerns of food security. The Internet of Things (IoT) has been suggested as a potential tool for farmers to overcome the impact of climate change on food security. However, there is dearth of research on the readiness of implementing IoT in South Africa's agricultural sector. Therefore, this research aims to explore the readiness of the agricultural sector of South Africa for a wide implementation of IoT. This research conducts a desktop study through the lens of the PEST framework on the special case of South Africa. A thematic literature and documents review was deployed to examine the political, economic, societal and technological factors that may facilitate or impede the implementation of IoT in the agricultural sectors of South Africa. The findings suggest that the wide ranging political, economic, societal and technological constructs enable the implementation of IoT within South Africa's agricultural sector. The most important include current policies, technological infrastructure, access to internet, and mobile technology which places South Africa in a good position to implement IoT in agriculture.