

ICED21 AFRICA-DESIGN ONLINE WORKSHOP REPORT

A NETWORK HUB FOR RESEARCH, EDUCATION, AND PRACTICE IN GLOBAL SUSTAINABLE DEVELOPMENT

Hosted by The Design Society

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Executive Summary

It has been stated that by 2050, two in every 5 children will be born in Africa. However, Africa continues to have the lowest number of engineering professionals per capita of all regions of the world. With Engineering education changing from its traditional focus on disciplinary technical knowledge to a much broader interdisciplinary and complex problem-solving approach that integrates societal problem analyses with academic technical knowledge and solutions, it was imperative for AFRICA-DESIGN to engage with this as our overall thematic theme for the AFRICA-DESIGN ICED21 workshop. This is in line with AFRICA-DESIGN's aim - building a network of design researchers, educators, and practitioners based in African countries with particular emphasis on design for sustainable development.

In the planning of this year's workshop, the organizing team aimed to attract and engage with younger audiences to participate in Design Society activities through AFRICA-DESIGN by providing a platform that allowed the youth to network and engage on matters of design, sustainability, research, education and innovation in Africa. It is safe to say that strides were made in achieving this objective. This can be highly attributed to the early preparation, learnings from the previous workshops and some of the activities the team organised leading up to the workshop.

More specifically, the 'Call for Abstracts' provided a platform for students to submit and showcase their ideas to receive potential advice and mentorship from experts and other parties interested in collaborating. Through the call, the team received 20 inspiring abstracts on different themes from students all over the world with different ideas and solutions for the African continent. It was from this pool that the speakers of the workshop were selected, as you will see below. Even with the time constraint that comes along with hosting online workshops, the presenters and the organizing team did their best as much as time and the platform would allow them to engage and build up on the ideas that were presented. It was evident that more engagement was necessary and yearned to have more constructive discourse on the presentations.

In the same workshop, the AFRICA-DESIGN team was able to present a snippet of the Pre-Workshop Survey on Sustainability that was conducted earlier in the year that provided interesting data and insights after its analysis. It was from this survey that the themes and questions from the breakout room were extracted. Through the feedback received from the participants we can confidently state that the workshop positively contributed to this.

Key Findings and Recommendations

- As seen and noted even from our previous workshop, a lot of projects around design for sustainable development have been, are being or will be done in Africa.
- There is a need to set up more conferences and workshops, specifically on design for sustainable development in Africa to harness collaborations and networking.
- In the same light, there is a need to make the stated events more affordable and accessible to participants all around the globe for diversified and inclusive output that is very welcomed in the academic and research field.
- That said, in order to attract, ensure continuity and promote peer to peer learning in the design and research field, provision of student friendly prices or fee waivers to the above-mentioned events would greatly improve accessibility and even attract more undergraduate students to the design and research field.
- There is a need for a platform where interested parties can regularly ‘meet’, converse and engage on specific projects that are in line with their interests to promote collaboration.
- Young Africans are interested and willing to engage and ideate on Sustainable Development in Africa.
- Even with the diversification of engineering there is still a growing interest in the academic angle of it.
- The virtual nature of the conference alienated the expenses that would normally be a key hindrance for participants to attend such a workshop if it were hosted physically.
- The provision of sponsored fee waivers allowed for more participants from the global south to participate in the workshop.

Major Challenges

- Due to the nature of a virtual workshop, poor connectivity and lack of a stable internet connection was a challenge for some participants.
- In the same regard, the time constraint did not allow for further discussions for the student presentations made.
- During the discussions, notably some collaboration would take time to be realised due to COVID-19 affecting the same in many ways.
- The difference in time zones was also a challenge affecting participation.

Next steps

- The AFRICA-DESIGN team is in the works of preparing a new event series dubbed the ‘AFRICA-DESIGN Barazas’. More details on this will be posted on our website and LinkedIn page.
- The summary of the workshop will be made available on the AFRICA-DESIGN website.
- Participants are encouraged to join the AFRICA-DESIGN LinkedIn group as we look forward to more activities and events leading up to the Design 2022 Conference.

Background

AFRICA-DESIGN was featured at the 23rd International Conference on Engineering Design (ICED) 2021 Conference for the second time with an online workshop. The conference took place in Gothenburg, Sweden via a hybrid meeting, with the majority of workshops taking place online and a partly physical conference for a limited number of participants. The AFRICA-DESIGN initiative seeks to build a network of design researchers, educators, and practitioners based in African countries with particular emphasis on design for sustainable development; and to link them with colleagues in the worldwide design community. The initiative builds on the perception of mutual learning opportunities in the challenges that we all share.

Scope

In its planning, the workshop targeted to focus mainly on the topics of interest from the responses of the survey designed and conducted by the AFRICA-DESIGN team in the first half of 2021. The purpose of the survey was to gain more insights on sustainability at large, identifying gaps within sustainability and seeking inspiration for guiding the AFRICA-DESIGN workshop themes, activities and action items.

From the survey, the following themes were identified and selected:

1. Sustainability in Communities
2. Sustainability and Information Technology
3. Sustainability and Generations
4. Sustainability and Education
5. Sustainability and COVID-19
6. Sustainability and Collaboration

The **objectives** of the workshop were to:

1. Engage the youth: Provide opportunities for a young audience to connect with professors and practitioners and engage with others.
2. Inspire action: Focus on building action-oriented events that can initiate long-term changes
3. Provide a networking platform: Promote the LinkedIn group and use Design Society links to connect for long-term collaboration opportunities.
4. Learn together: Opportunities for mutual learning from each other's work and past experiences.

Format of the Workshop and chronological summary of the workshop: what happened in each workshop session, highlighting key results.

16.30 Welcome, introductions

Introduction by Susanne Nilsson

Welcoming and introductory remarks were held by Susanne Nilsson. She addressed the need to include African countries to design and engineering activities as there is a lack of participants from this continent in events such as The Design Society. She further argued that engineering education is changing its traditional focus on disciplinary technical focus towards a broader interdisciplinary and complex problem-solving approach. This new approach integrates societal problem analyses and requires collaboration with people from all parts of the world, African countries especially. She further addressed the need to act in terms of environmental sustainability. Following that we need new solutions, to act now and that we need to act in collaboration.

Susanne Nilsson then introduced and described AFRICA-DESIGN: AFRICA-DESIGN started in 2019, this being the 3rd workshop. AFRICA-DESIGN was created as an action to the idea and intention that The Design Society aims to serve as a community builder leveraging a number of existing relationships between its members and colleagues in African countries, as well as cultivating new ones with academic, government, and other organizations. AFRICA-DESIGN is an initiative within Design Society to build a network of design researchers, educators, and practitioners based in African countries with particular emphasis on design for sustainable development; and to link them with colleagues in the worldwide design community. The initiative relates to the KTH Global Development Hub and builds on the perception of mutual learning opportunities in world-wide challenges, such as sustainability challenges.

Susanne Nilsson ended her introductory speech by addressing the workshop participants and listeners that their engagement and ideas are key to our success!

Team Presentation

All AFRICA-DESIGN team members introduced themselves, see appendices.

Sustainable Behaviour Survey Report Presentation by Julia Mortensen

The AFRICA-DESIGN Team had earlier this year done a survey study on sustainable behaviours. The study and report were presented during the workshop: *A Report on the Results of The ICED21: Pre-Workshop Survey on Sustainability*. The purposes of the study were presented such as to gain more insights on sustainable development and design at large, to identify sustainability gaps that are not focused on enough and as inspiration to guide the AFRICA-DESIGN workshop themes, activities and action items. Further the methods used during the study were presented: quantitative and qualitative questions by using open ended and Likert Scale questions through an online survey. The analysis included response comparisons of age, regions and professional status. The online survey had 41 respondents from around the globe, with an interest in sustainable design. Thereafter, a few interesting results were presented.

*We refer to the Report: *A Report on the Results of The ICED21: Pre-Workshop Survey on Sustainability*, on the AFRICA-DESIGN website: <https://africadesign.designsociety.org/> to read more results and responses.

17:00 Ice Breakers

The participants introduced themselves by stating who they are, where they are from and their affiliation mostly related to research work and projects in Africa.

17:10 Student Speaker 1 Presentation

Humphrey Otieno Owour

Strathmore University

Kenya

A Cost Effective and Distributed 'Mtaani-Tech' Bin for Sustainable Waste Management Procedures and Bridging the Gap of Access to Clean Energy in Slum Areas: A Case of Kibera Slums.

The project presented by the Strathmore student Humphrey Owuor presents a new solution to household waste management targeting users in the slums of Kibera, namely the 'Mtaani-tech' bin. This product is designed to meet the user needs of creating cost effective, easy-use and safe waste management as well as a solution to create electricity through the energy of the waste.

A few of the Comments, Questions and Responses from Humphrey's presentation

- *"Ambitious project! Isn't it a health issue to burn asbestos sheets - or have them near if they have any broken parts?"* "Thanks for the question. It is true that asbestos sheets present a health challenge. We can consider exploring other safe fireproof materials for the incinerator."
- *"Did you make any real life tests?"* "No life tests yet."

For more information on Slums of Kibera:

Mutisya, E., & YARIME, M. (2011). Understanding the Grassroots Dynamics of Slums in Nairobi: The Dilemma of Kibera Informal Settlements. *International Transaction Journal of Engineering, Management, & Applied Sciences & Technologies*, 2(2), 197-213.

Link: <http://tuengr.com/V02/197-213.pdf>

17:15 Student Speaker 2 Presentation

Eric Reynolds Brubaker

Stanford University

United States of America

Situated design expertise: An expert-expert think-aloud study with Kenyan and American designers

Eric's study examines how much expert design professionals enact expert design practises when there is concordance (versus discordance) between their cultural background and the cultural context of the design situation. A pilot and preliminary analysis found that designers working on a culturally concordant design challenge were more likely to enact expert design practises. This suggests that the context in which design expertise is called upon may affect the degree to which expert designers enact their expertise. This has major implications for how design expertise is conceptualised and developed and who should be engaged in designing in a given context. The study highlights that if we expand our view of design expertise and account for its situated nature, we may recognise these possibilities for obfuscation, build scaffolds for expert designers working in culturally discordant settings, and train the next generation of designers to effectively address design challenges across cultural contexts.

A few Questions and Responses from Eric's presentation

- *"I totally agree with the situated in context argument. It seems to me that there is more with the expert designers assuming their expertise extends beyond its actual boundaries... I wonder how you defined/ascertained an 'expert' in the two settings."* - "Thanks for your comment and question. I used the approach taken by other studies of design expertise (e.g., Björklund, 2013) which is to select design engineers who have 10+ years of professional design experience. It is interesting to think about how designers think about the bounds of their expertise."
- *"Eric, it might be interesting for you to find collaborators in your project within this workshop? Many good people from the African continent are attending!"* - "As Margareta suggested, I would be happy to hear from anyone in the workshop who may be interested in collaborating. If you are interested, please free to reach out: ewr@stanford.edu"
- *"Eric, very interesting presentation. Do you have a sense for how many samples you would need to extract reliable findings?"*
- *"Eric, and how long does one experiment take? For example, how many hours does an expert designer need to dedicate to one sample of your study."*

17:25 Break

17:35 Student Speaker 3 Presentation

Karen Mbene

Botho University

Botswana

Recycling Paper in the Learning Environment

The presentation by Karen Mbene from Botho University alluded to the fact that while there are newer technologies available, most learning institutions insist that new exercise books are used at the start of every new year. This, while the old books have ample writing space and blank pages. The idea is linked to Sustainable Development Goal number 12, 'Responsible Consumption and Production', therefore, taking advantage of recycling and reusing this paper is a straightforward and easy method to consume responsibly.

A few comments and responses from Karen's presentation:

- *"Love the deconstruction of the idea that sustainability is a complex thing!"* "I really believe that everyone can live sustainably by taking simple steps toward responsible consumption and production."
- *"Karen, lovely presentation! I remember trying to do the same thing with leftover pages but my 'notebooks' didn't look so nice!"* "Thank you! I hope you can try again."

17:40 Student Speaker 4 Presentation

Cara O'Sullivan

University of Liverpool

United Kingdom

Designing an All-terrain Wheelchair in Kenya; A Case Study of Design for Social Impact in Low-Resource Settings

This case study offers an empirical account of the design of an all-terrain wheelchair called 'SafariSeat', which has been designed, tested, manufactured and turned into a sustainable enterprise in East Africa.

Having developed SafariSeat with a human-centred design approach, a local mindset, and prioritisation of usability and affordability. The case study on SafariSeat explains challenges encountered whilst designing in a low-resource setting, and highlights how local collaboration and partnerships can help create a more sustainable design solution that is framed and validated by those with lived experience in the context.

A few Questions and Responses from Cara's presentation

- *"I assume you know the wheelchair developed with what seems the same purpose by Amos Winter of MIT? Would be worth looking into this."*
- *"Is SafariSeat a business now?" "SafariSeat is part of The Accessibility Institute (TAI), consisting of an NGO in Sweden, and a social enterprise in Kenya. TAI's mission is to bring SafariSeat to a wider user base through an innovative business model and the construction of new workshops, both in Kenya and across East Africa."*

17:45 Breakout logistics (Rules of engagement, Breakout room themes and questions)

Workshop participants, aided by the rules of the engagement and the themes to be discussed were presented. Participants had the choice to decide which breakout room they would like to participate in. Out of the six themes, only four were chosen by participants, therefore, two themes were not addressed at the workshop. For each theme, there were two questions, comprising 'what' and 'how' related to the theme, with discussion for 15 minutes and 20 minutes for each question, respectively.

Breakout Room 1

Theme: Sustainability in Communities

Number of Participants: 6

Questions:

- *What actions are taken within my community to encourage sustainable behaviours?*
- *How can we re-design product-service design and innovation methods to encourage and share sustainable behaviours/actions within and between communities?*

The participants in the breakout room with the theme 'Sustainability in Communities' applied the 'what' question from their personal experiences and how sustainable behaviours are applied in their communities. Participants mentioned some actions they take in their personal capacity such as reusing milk cartons and plastic bags as pot planters, passing down textbooks from sibling to sibling, and using plastic bags as a protective cover for those books. It was also highlighted that responsible consumption is an intentional action and if opportunities are available, for example, various bins for various materials, this could encourage sustainable behaviours. In the community sense it was noted that recycling was restrictive, meaning that not all plastic products could be recycled, and that glass could not be recycled but taken to another centre, which could discourage recycling. Focusing on recycling and doing so on a regular basis can reveal the minimal amount of general waste one has.

The discussions around the 'how' question revealed how countries are already implementing policies for sustainable behaviours, the EU and some African countries charge for plastic bags, which has dropped the consumption of them considerably, and using woven or cloth bags that are reusable in their place. On the other hand, if individuals want to buy local products from the farmers markets, these

vendors often only have plastic bags for their goods. In urban and accessible areas such as malls, there are opportunities for the disposal of different waste to various bins, such as plastic and paper. If these options are made available, it can encourage the public to recycle on a larger scale.

In conclusion, it was stated that as wealth increases, sustainable behaviour decreases, while a lack of resources can lead to innovative ideas and more sustainable solutions in rural areas, in addition younger people seem to be driving a minimalist lifestyle. Furthermore, designing products that have reusable parts or components for alternative uses as well as creating products with available spare parts that individuals can fix on their own. Finally, creating awareness and information on the 'cost' of unsustainable behaviour could assist in shifting the mindset leading to more responsible behaviours and consumption.

Breakout Room 2

Theme: Sustainability and Information Technology

Number of Participants: 5

Questions:

- *What information technologies and solutions am I using or am I aware of that are encouraging sustainable behaviours/actions?*
- *How can we re-design information technologies and solutions to encourage sustainable behaviours/actions?*

The breakout room was attended by three Strathmore students who were planning a project on digitizing hospital documentation such as patient journals in Kenya. Further, Julia Mortensen and Susanne Nilsson from the AFRICA-DESIGN Team participated in the breakout room. Naturally, the conversations were derived to discuss the Strathmore students planned project as it was in line with the breakout room's theme and questions.

The discussions surrounded what issues could arise during this project. The discussion touched the issue of how to make value of service and what type of revenue model it could have. However, a larger discussion involved having a central database and what issues that could appear with that. The breakout room also discussed how education in hospitals could be a solution to market the idea and product as well as how it can be used as effectively as possible. Other subjects that were brought up were: the issue of data integrity, issues of working with and between different sectors (public and private) and how to scale up. Susanne Nilsson also mentioned the possibility for the student to contact Design Society HealthCare SIG.

Breakout Room 4

Theme: Sustainability and Education

Number of Participants: 8

Questions:

- *What education programmes or courses related to global sustainability and design am I aware of or have experience from?*
- *How can we re-design education programmes or courses so that they support global sustainability and design?*

In this breakout session participants discussed the 'what' question by mentioning various projects that are ongoing at universities in Africa, focusing on the Sustainable Development Goals, and while having an impact on society. Other programmes included challenge-based projects or innovation in which students come up with solutions for societal challenges which are set by various NGOs or private entities.

For the 'how' question, it was discussed how Design Thinking can be used to tackle challenges, although Design Thinking is not a sustainability approach method, but there are various sustainability approaches. Whilst sustainability is mostly viewed as an environmental/green approach and therefore not often applied in other fields or in a social setting, the mindset needs to shift as sustainable development and sustainability can be applied to several areas. For example, sustainability in finance or tourism. Non-designers can be apprehensive to solve problems using creative methods, but it could address challenges with more ease and these methods could be used over traditional research approaches. Creating knowledge about sustainability, how it works and how it can be implemented should be expanded.

In conclusion:

- Sustainability is briefly introduced at university level, often at a later stage in the degree.
- More education and knowledge on sustainability from an earlier age or across all educational levels should be introduced to be incorporated into daily activities to invoke change or inspire action.
- Sustainability needs more attention and awareness in Africa.
- The environment is only one aspect of sustainability and that should be recognised.
- Different approaches and methods on sustainability need to be taught and learnt, including aspects on how to overcome the challenges of sustainable development.

Breakout Room 5

Theme: Sustainability and COVID-19

Number of Participants: 6

Questions:

- *COVID-19 has altered the behaviour of most individuals globally. Our survey indicates that the differences among individuals and countries are large. What sustainable behaviours have you changed due to the pandemic so far?*
- *How can we redesign our technologies/product-services and our ways of collaborating/working so we can take advantage of differences among nations in sustainable behavior changes due to the pandemic?*

In this breakout room for what sustainable behaviours have you changed due to the pandemic so far? Some of the responses from the participants were; due to COVID-19 restrictions on how many students can be in a bus, students started walking and biking to school. There was less travelling as meetings were virtual. More opportunities for working remotely were now available. City streets have been remodelled to be more pedestrian friendly and reduce traffic in the city. Interestingly, in Sweden, people were getting more into their cars than public transport to avoid crowded places, but still less congestion on roads than before the pandemic because people were working from home. Vacations are now more local due to the travel restrictions in Kenya and around the world hence reducing the carbon footprint. People are eating more healthy foods as a sustainable way of living. There has been less use of paper

as we now have more cashless transactions.

On the how can we redesign our technologies/product-services and our ways of collaborating/working so we can take advantage of differences among nations in sustainable behavior changes due to the pandemic question Members of the breakout room answered; By trying to promote and encourage companies and organizations to allow for people to work from home. Working from home also allows for the company to save money on resources like space and electricity. It was highlighted that people in Sweden have now realised that they can work remotely from the countryside which enables them to consider moving out of the cities - improves on noise pollution with less cars in the city. Also promotes investing in the infrastructure in countryside communities/towns. Supporting online businesses with necessary infrastructure that allows them to thrive.

18:25 Break

18:35 Breakout Room Report Back

During this section, the reporters from the different breakout sessions shared in the main session what was discussed in the specific breakout sessions for all the workshop participants to be able to get a glimpse of what was discussed in the other sessions. Summatively put in the section above.

18:55 Senior Speaker Presentation

Wycliffe Guguni

Strathmore University

Kenya

19:05 Feedback on student speakers and breakout room presentations

19:15 Reflections from Participants, Next Steps and Closing Remarks

Panos Papalambros

Bernard Shibwabo

The closing remarks were made by Bernard Shibwabo and Panos Papalambros.

Many of the participants left positive reflections and their gratitude in the chat at the end of the workshop. A few quotes included:

“Thank you for organizing a great workshop. I also enjoyed meeting new friends and see old ones. I feel inspired by the incredible work that was shared.”

“Thanks a lot for this inspiring workshop! Really interesting to discuss sustainable design issues with different cultural and geographical perspectives!”

“Wonderful workshop. The best part in my opinion was the wide range of participation from around the world. I enjoyed the focus on collaboration. It was great to see friends and made new ones. These nudges toward continued discussions and collaborations are very useful.”

The reflections were later used by the AFRICA-DESIGN Team to reflect upon the workshop and note down what and how to improve future workshops.

19.30 Workshop ended

Acknowledgements

The Design Society

ICED21 Workshop Organisers

Our Amazing Presenters

Everyone that took time out to join and participate in the workshop

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The Faculty Team

Appendices

Workshop Organizers:

Faculty:

Margareta Norell Bergendahl - KTH Royal Institute of Technology, Stockholm, Sweden.

Susanne Nilsson - KTH Royal Institute of Technology, Stockholm, Sweden.

Panos Papalambros - University of Michigan (UM), United States.

Bernard Shibwabo - Strathmore University (SU), Nairobi, Kenya.

Students:

Julia Hede Mortensen - KTH Royal Institute of Technology, Stockholm Sweden.

Dunja Stevanovic - Botho University (BU), Gaborone Botswana and KTH Royal Institute of Technology.

Michelle Wanyang' - Strathmore University (SU), Nairobi, Kenya and KTH Royal Institute of Technology.

Paulina Rajski - University of Michigan (UM), United States.

Anabel Sicko - University of Michigan (UM), United States.

Participating Institutions:

We acknowledge that this list may not be conclusive.

Blekinge Institute of Technology - Blekinge, Sweden

Botho University, Jewellery Management and Design - Gaborone, Botswana

Brigham Young University, Mechanical engineering - Utah, United States

Chalmers University of Technology, Department of Industrial and Materials Science - Göteborg, Sweden

Delft University of Technology, Department of Multi Actor Systems - Netherlands

ETH Zürich/Swiss Federal Institute of Technology, Mechanical and Process Engineering, Switzerland

Middlesex University Business School - London, United Kingdom

Paris-Saclay University, Centrale Supélec, Industrial Engineering Laboratory - Paris, France

Singapore University of Technology and Design (SUTD), Engineering Product Development - Singapore

Stanford University, Mechanical Engineering, Global Studies - California, United States

Strathmore Business School - Nairobi, Kenya

Strathmore University, School of Computing & Engineering Sciences - Nairobi, Kenya

SystemX Technological Research Institute - Paris, France

University of Bologna, Bologna Business School - Italy

University of Cambridge, Engineering Design - United Kingdom

University of Liverpool, Inclusive Design & Human Centred Innovation - United Kingdom

University of Liverpool, Industrial Design - United Kingdom