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Humanitarian Architecture in Service of a Vulnerable Community: Design of an Empowerment Center for Refugee Women in the Minawao Camp in the Far North of Cameroon

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Abstract:- This article presents the design of an empowerment center for refugee women in the Minawao camp, located in a Sudano-Sahelian region. The study identifies opportunities to improve living conditions through vocational training and economic empowerment programs. The architectural design, using local materials such as earth, addresses the specific needs of women while respecting cultural norms. The project, involving community participation, emphasizes flexibility, sustainability, and cost-efficiency in a humanitarian context.

Keywords:- *Empowerment, Refugees, Humanitarian Architecture, Local Materials, Resilience, Community Participation.*

I. INTRODUCTION

Since its opening in 2013, the Minawao refugee camp, located in the Far North of Cameroon, has grown to shelter over 77,884 refugees (UNHCR, 2024). The infrastructure and essential services are insufficient, with women facing heightened challenges related to security, reproductive health, and a lack of economic opportunities. Empowering these women is crucial to strengthening the resilience of this vulnerable population.

The design of empowerment centers tailored to the needs of refugee women offers a viable solution to these challenges by providing spaces for training, psychosocial support, and personal development. However, this initiative faces logistical, financial, and cultural constraints, necessitating the development of innovative and sustainable architectural solutions.

This article examines the specific needs of the refugee women of Minawao and proposes an architectural concept for an empowerment center that integrates sustainability, resilience, and cultural relevance. Through this approach, we aim to improve the living conditions of women and foster community cohesion within the camp.

II. METHODOLOGY

The research methodology employed a mixed-methods approach, combining primary and secondary data collection to capture a comprehensive understanding of the needs of refugee women in the Minawao camp.

A. Primary Data Collection

➢ *Three Techniques were Used:*

- **Site Analysis**: Evaluation of the camp's geographical, socioeconomic, and infrastructural context.
- **Surveys**: Structured questionnaires targeting women, youth, government officials, and healthcare staff to assess needs.
- **Interviews**: In-depth interviews with key stakeholders, including refugee women and UNHCR officials, to gather qualitative insights.
- **Observations**: Participatory and non-participatory observations to understand daily life and infrastructure use in the camp.

B. Secondary Data Collection

Reports, academic articles, case studies, and library research provided contextual and theoretical support.
This combined approach forms the basis for the design recommendations of the empowerment center for refugee women.

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III. DATA ANALYSIS

➢ *This Study Combines Qualitative and Quantitative Methods.*

- **Thematic Analysis**: Key themes were identified from transcripts and observations to capture women's needs and social dynamics (Braun & Clarke, 2006).
- **Descriptive Statistics**: Summarized the participation and variability of women's vocational training.
- **Inferential Statistics**: Tested hypotheses on the impact of space design and its correlation with unemployment reduction.
- **Software**: Python and Excel were used for data analysis and visualization.

This approach provides a robust basis for designing the empowerment center.

IV. PROJECT DESIGN STAGES

The design of the empowerment center for Minawao refugee camp follows a structured process inspired by Professor Umberto Turrini's principles (Turrini, 2020). This process consists of four key phases: initial design, functional and dimensional analysis, data synthesis, and final project documentation.

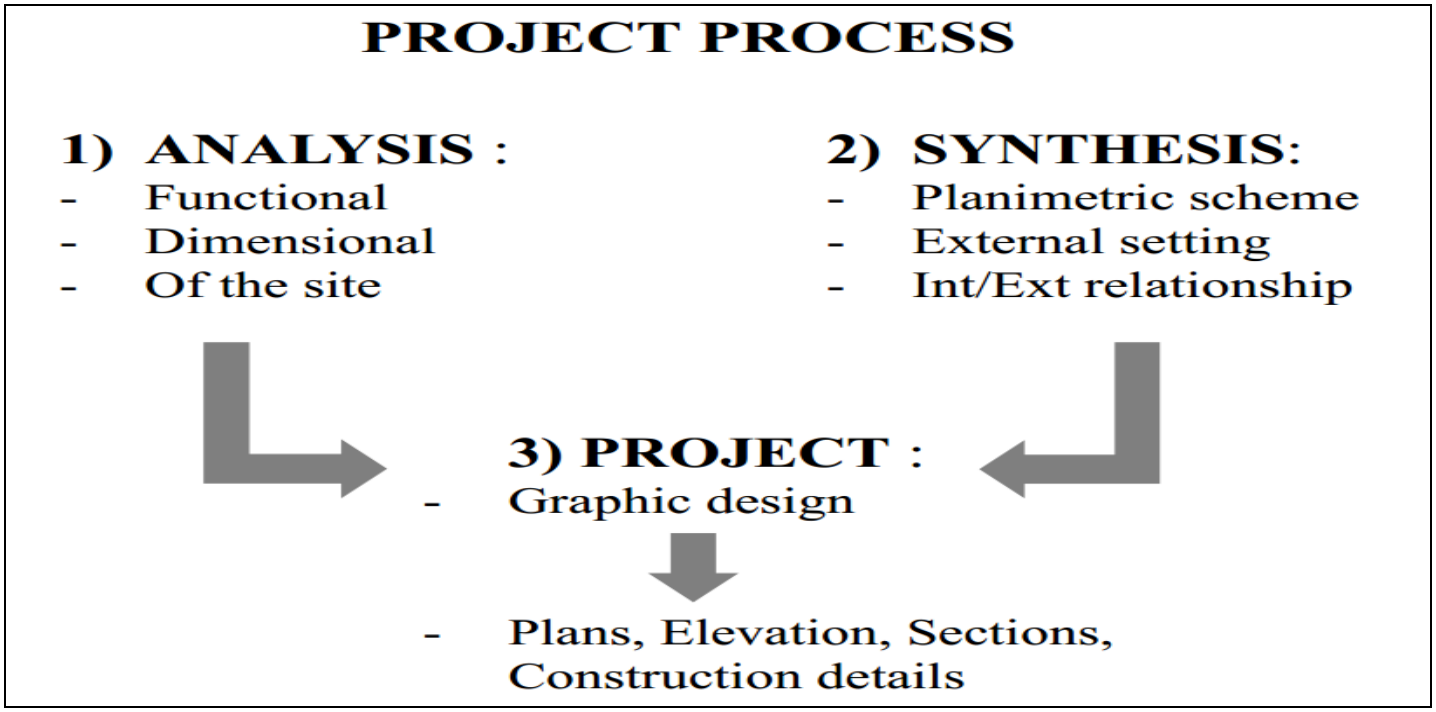

Fig 1: Structured Steps of Project Design

V. ANALYSIS

- **Functional Analysis**: Defines essential spaces like training rooms, psychosocial support, economic workshops, administration, and childcare, ensuring flexibility and efficiency.
- **Dimensional Analysis**: Optimizes space size to meet capacity and adaptability needs.
- **Site Analysis**: Evaluates location, topography, climate, resource availability, and security to ensure the center is sustainable, culturally relevant, and safe

This design approach ensures the center meets the specific needs of refugee women, while also being sustainable and adaptable to the local environment.

VI. RESULTS AND INTERPRETATIONS

A. Geographic and Demographic Context of Minawao Camp

Minawao refugee camp is located in the village of Minawao, Mokolo district, in the Far North region of Cameroon, approximately 72 km from Maroua and 70 km from the Nigerian border. The camp spans 623 hectares in the semi-arid plains of the "Mofu-Gudur Zone" (UNHCR, 2023) and was established in 2013 to accommodate those fleeing Boko Haram.

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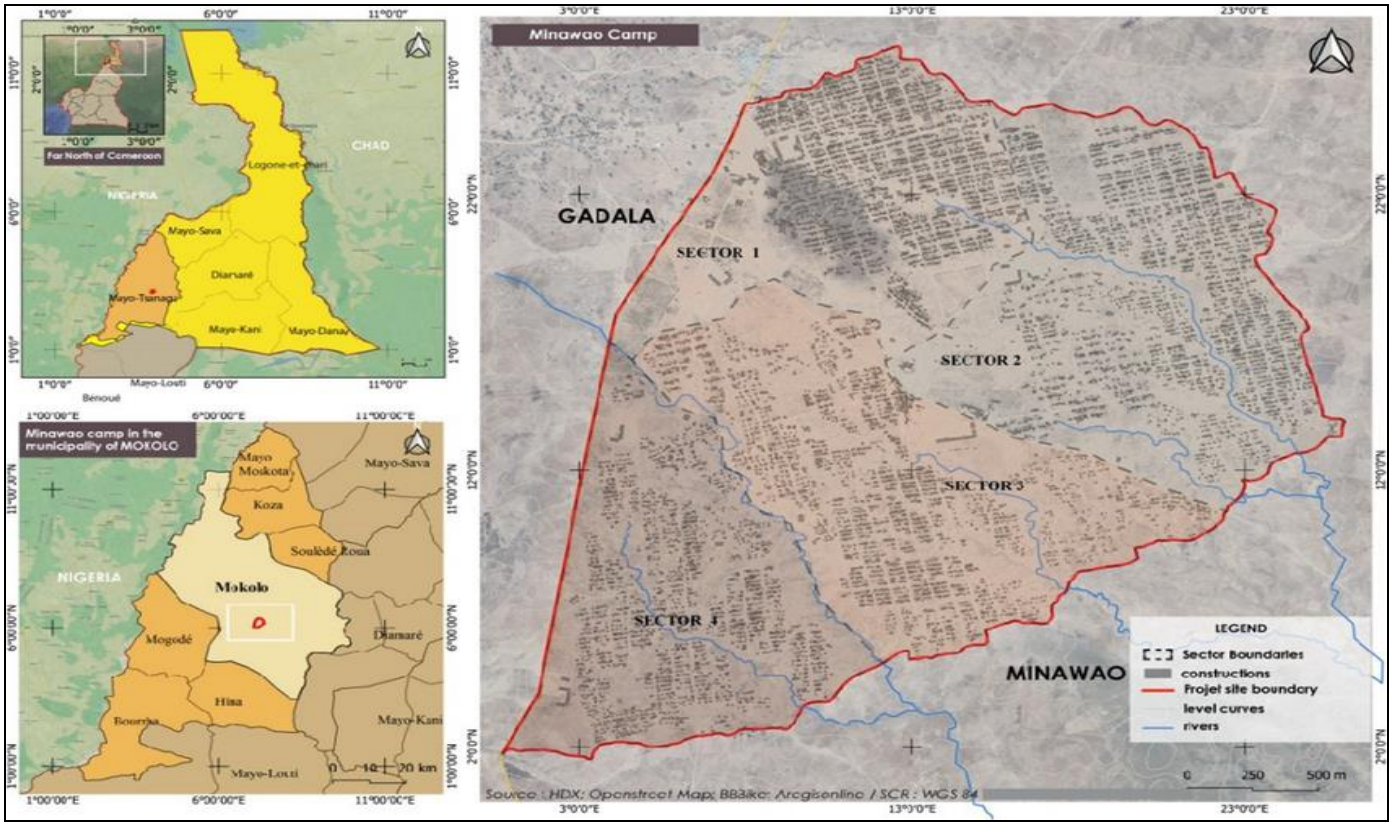

Fig 2: Geographical Location of Minawao Camp

Since its creation, the camp's population has grown rapidly, reaching 77,884 refugees in 2023, with an average of 1,786 new arrivals per month and 5,358 annual births (UNHCR, 2024). Women represent 54.19% of the population, highlighting the need for improved infrastructure to meet the educational and training demands of the camp.

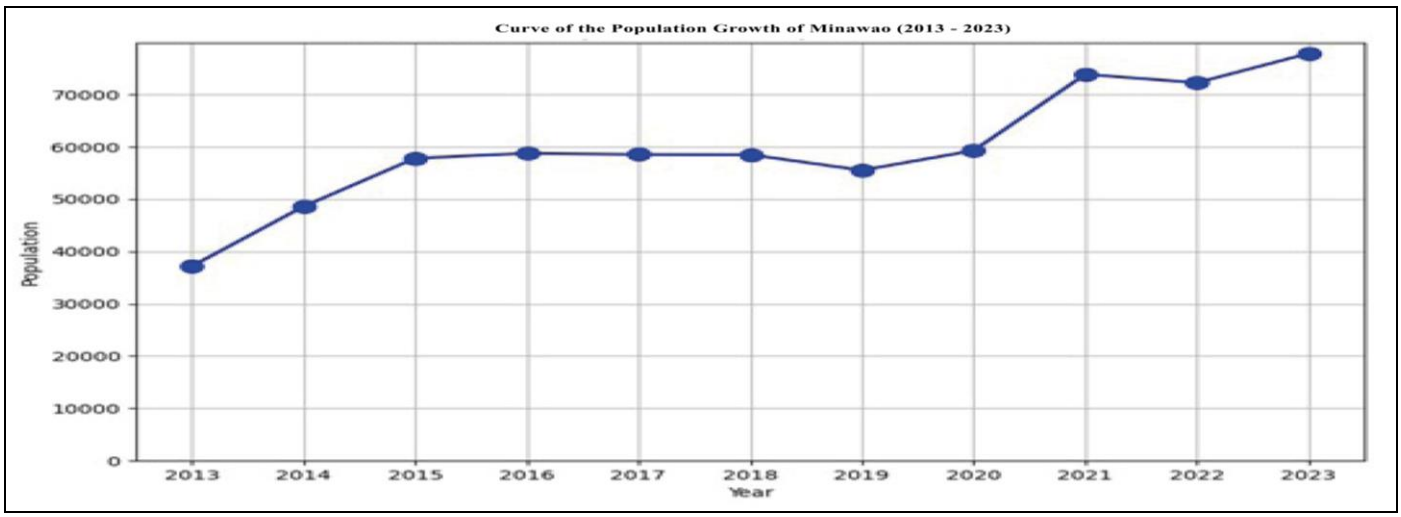

Fig 3: Curve of the Population Growth of Minawao

B. Training in Minawao Camp

Minawao camp struggles with overcrowded schools and limited resources for quality education (UNHCR, 2024).

- **Vocational Training**: Programs in sewing, weaving, and agriculture provide income-generating skills, with support for microenterprises (CARE, 2020).

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/IJISRT24OCT277

Fig 4: Tailoring Workshop, Minawao

- **Economic Empowerment**: Microfinance initiatives by UNHCR and UN Women support women's entrepreneurship, promoting financial independence (UN Women, 2018).


Fig 5: Field of Corn, Minawao

- **Challenges**: Resource shortages, inadequate infrastructure, and dependency on external funding hinder long-term program sustainability.

Vocational training is vital in empowering refugee women, offering practical skills that enhance their resilience and economic independence.

C. SWOT Analysis

Table 1: Analyzes the SWOT of the Minawao Refugee Camp

SWOT Analysis	Details
Strengths	- Established camp infrastructure. - Use of local, climate-suited materials (adobe, stone, cob). - Strong community engagement.

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Weaknesses	- Harsh climate with high temperatures and long dry seasons. - Degraded soils and limited construction options. - Financial and logistical constraints.
Opportunities	- Enhancing women's livelihoods and promoting economic independence. - Developing a sustainable construction model for replication. - Strengthening community resilience through job creation.
Threats	- Climate change worsening construction and maintenance conditions. - Political instability affecting project progress. - Increasing pressure on existing camp resources.

D. Site Selection Justification

The chosen site for the women's empowerment center is strategically located at 10°33'06.3"N and 13°51'48.2"E, centrally positioned between sectors 2, 3, and 4, providing easy access for women across the camp. Its proximity to key infrastructure, including a health center, primary school, and market, enhances its accessibility and integration. This location maximizes participation and interactions with existing services, ensuring the project's sustainability.

E. Site Study

- **Relief**: The relatively flat terrain minimizes the need for extensive land preparation, reducing costs.
- **Soil**: The clay-sandy soil is suitable for rammed earth construction, using local, sustainable materials ideal for the region.
- **Climat**: Located in a Sudano-Sahelian climate with limited rainfall (700-900 mm) and temperatures reaching up to 42°C, experiences frequent droughts, posing significant challenges for water access and agriculture.

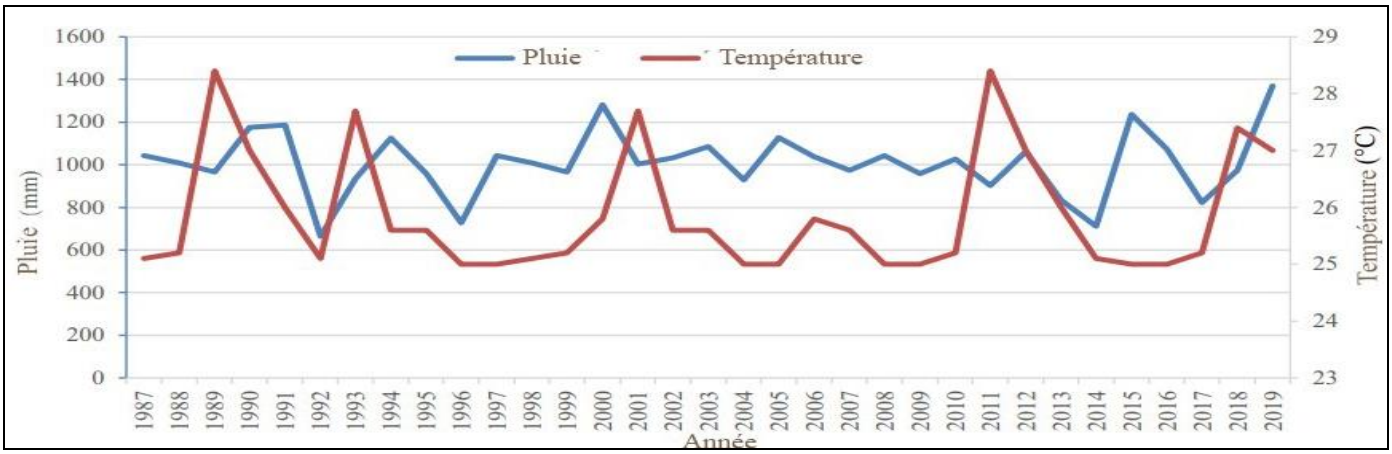

Fig 6: Ombrothermic Curve of Rainfall and Temperature in Minawao

- **Access and Orientation**: Two secondary roads provide easy access to the site, facilitating interaction with nearby key infrastructures like the school (south), health center (north), and market (west), ensuring integration with the camp.


Fig 7: Project Site

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/IJISRT24OCT277

F. Architectural Programming

➢ *The Design of the Women's Empowerment Center is Pragmatic and Cost-Effective, Integrating Key Elements:*

- **Resilience & Shared Spaces**: Includes a community courtyard and adaptable spaces for social and educational activities.
- **Local Materials & Flexibility**: Uses rammed earth construction, with a modular design for future expansion.
- **Community Engagement**: Involves locals in the construction process to enhance ownership.
- **Cultural Adaptation**: Ensures alignment with local cultural norms.
- **Dignity & Privacy**: Provides private toilets and rest areas for women.
- **Cost Efficiency**: Prioritizes economical, durable solutions.

VII. ARCHITECTURAL DESIGN PROPOSAL FOR A WOMEN'S EMPOWERMENT CENTER IN MINAWAO CAMP

The proposed Women's Empowerment Center in Minawao refugee camp addresses the specific needs of refugee women by offering a secure space for professional skills development and economic empowerment. The design considers the climatic, social, and cultural context while integrating sustainable and ecological principles of humanitarian architecture.

A. Architectural Programming

➢ *The Center is Organized into Three Main Functional Blocks:*

- **Training and Education**: Classrooms and multipurpose spaces for vocational training in areas such as sewing, agriculture, and micro-enterprise management, as well as literacy programs.
- **Production and Craft Workshops**: Equipped spaces for income-generating activities like sewing, weaving, pottery, and food processing.
- **Health and Well-being**: Areas for psychosocial support, legal consultation, and health services tailored to the needs of women, ensuring their overall well-being.

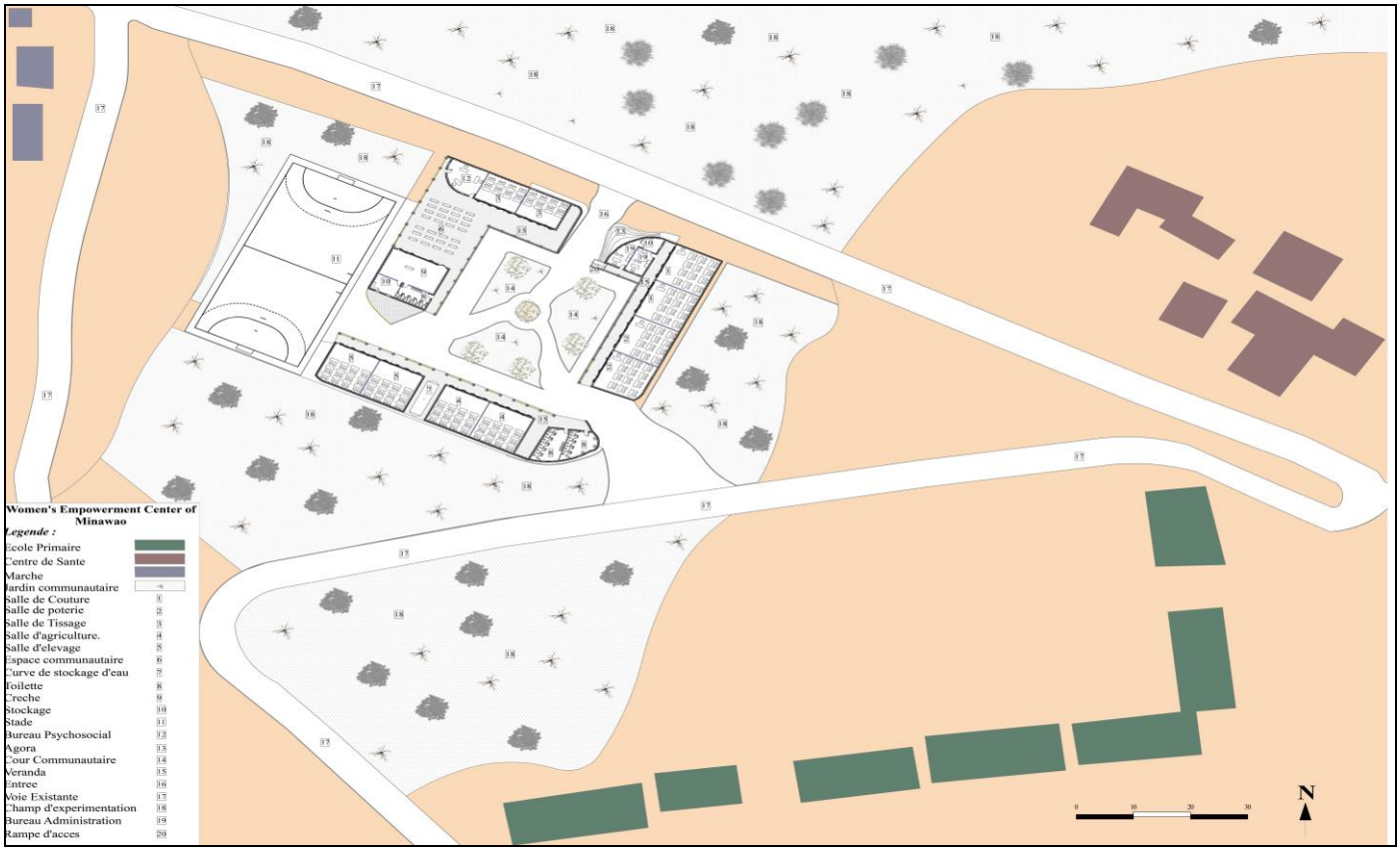

Fig 8: Site Plan

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/IJISRT24OCT277

Table 2: Gives Use the Architectural Programming

Space/Room	Description
Training and Education Block	Classrooms and multipurpose spaces for vocational training and education programs.
Production and Craft Workshops	Spaces equipped for income-generating activities like sewing, weaving, and food processing.
Health and Well-being Block	Private and secure spaces for psychosocial support, health services, and legal consultations.
Community Garden	A therapeutic and agricultural space for cultivating medicinal plants and vegetables.
Agora and Community Space	A communal area for meetings, cultural events, and social interaction.
Psychosocial Support Center	Center providing emotional and psychological support for women in vulnerable situations.
Administrative Offices	Offices for the management and administration of the center and its programs.
Sewing and Weaving Workshop	Workshop equipped for artisanal activities like sewing and weaving.
Pottery and Food Processing Workshop	Spaces for pottery making and food processing activities.
Legal Consultation Space	Dedicated space for legal consultations and administrative assistance.
Sanitary Facilities	Toilets and showers with a greywater management system.
Crèche (Childcare)	A secure space for childcare, allowing mothers to participate fully in center activities.

B. Spatial Organization

The center's spatial organization is based on a modular cluster layout, allowing for flexibility and future expansion as needs evolve. Each block (Training and Education, Production and Craft, Health and Well-being) is modular, meaning spaces can be added or reconfigured as needed. The blocks are strategically placed to facilitate easy circulation between them and maintain a clear flow of activities:

- **Training and Education Block**: Positioned near the entrance for easy access, ensuring trainers and participants can quickly move between training spaces and community areas.
- **Production and Craft Block**: Located adjacent to the training block, allowing seamless transition from learning to practical application in the workshops.
- **Health and Well-being Block**: Set slightly apart to provide a quieter, private space for psychosocial support and health services, while remaining easily accessible to all participants.

The **modular design** of each block ensures that the center can adapt to future growth or changes in programmatic needs, promoting both flexibility and scalability.

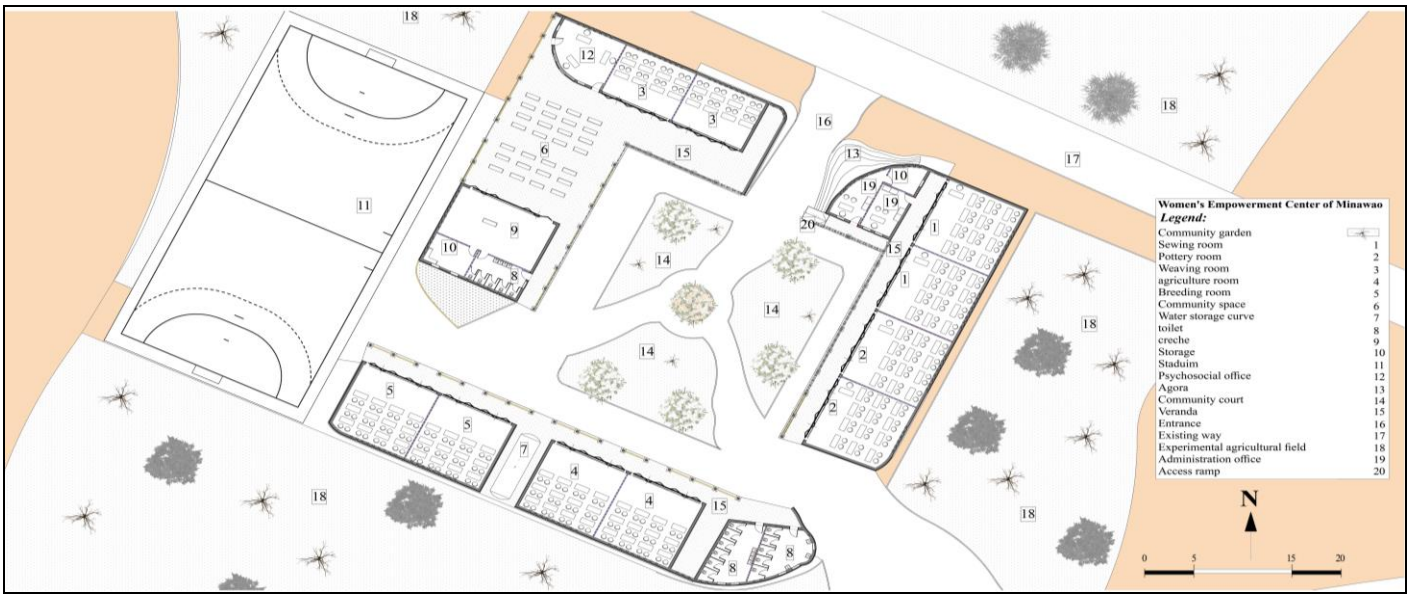

Fig 9: The Floor Plan

C. Architectural Concept

The architectural concept is based on principles of sustainability and bioclimatic design, with a strong focus on the use of **local materials** and construction techniques, particularly rammed earth. This material choice not only enhances the thermal comfort of the buildings but also promotes the use of local, sustainable resources.

- **Modular and Flexible Design**: The center is organized into clusters around a central courtyard, facilitating

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/IJISRT24OCT277

interaction and communication among users while maintaining distinct zones for each function (training, production, and health services). The modularity of the design allows for easy expansion and reconfiguration of the space.

- **Local Materials**: Rammed earth is used as the primary construction material due to its thermal mass, which helps regulate indoor temperatures in the hot, arid climate. This material choice is also culturally appropriate and environmentally sustainable, as it reduces the need for imported materials.

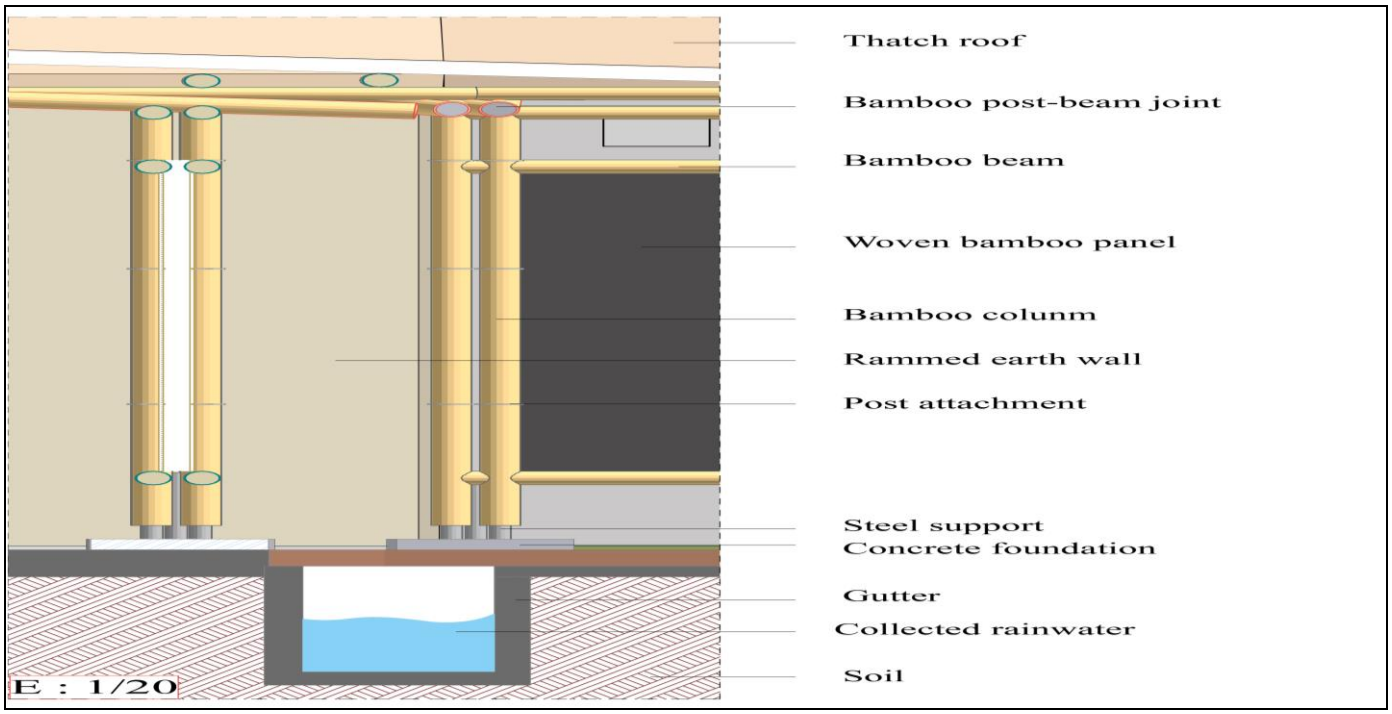

Fig 10: Detail of the Different Elements

- **Vernacular Inspiration**: The architectural forms draw from local traditions, incorporating sloped roofs, deep eaves, and natural materials like bamboo and thatch. These features not only respect the local aesthetic but also enhance the building's environmental performance, particularly in terms of shading and rainwater collection.

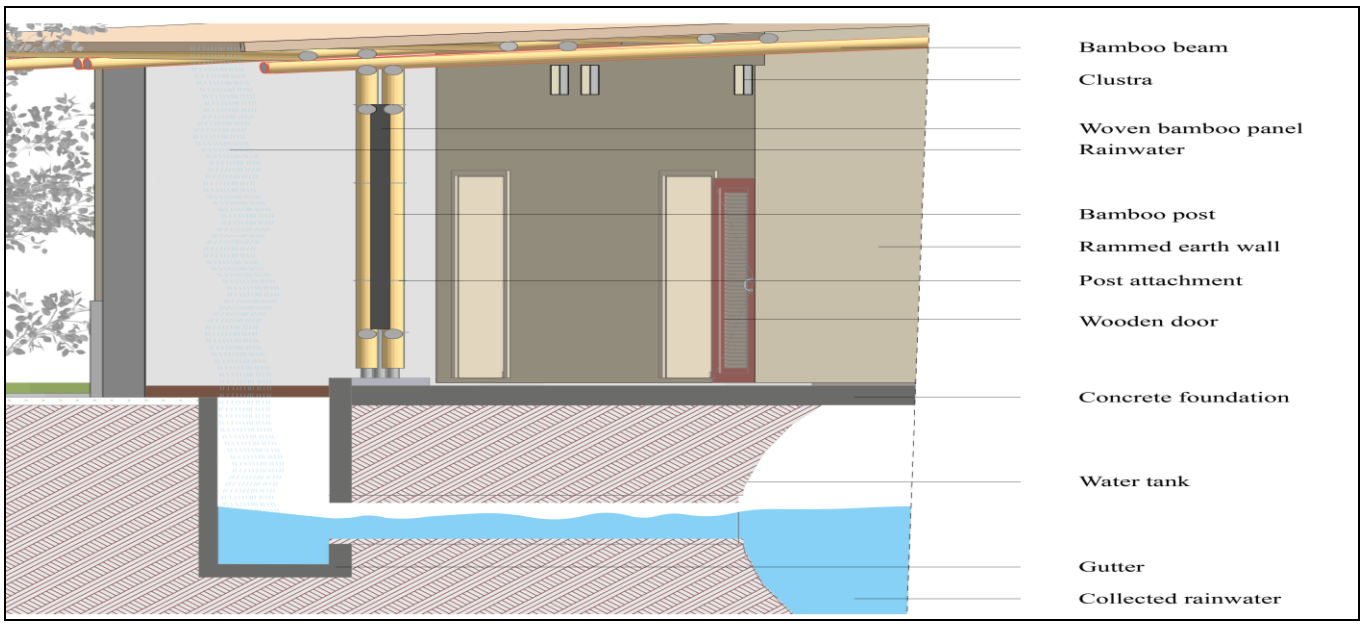

Fig 11: Rainwater Harvesting System Detail

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D. Design Strategies

- **Natural Ventilation and Thermal Comfort**: The orientation of buildings allows for cross-ventilation, while the thick rammed earth walls provide insulation, keeping interiors cool during the day and warm at night.
- **Overhanging Roofs and Rainwater Collection**: Sloped roofs provide shade and protect the buildings from rain, while integrated rainwater harvesting systems collect water for use in the garden and for toilets.
- **Passive Systems**: The design maximizes natural light to reduce energy use, and solar panels can be installed to power administrative areas and workshops, minimizing dependence on external energy sources.

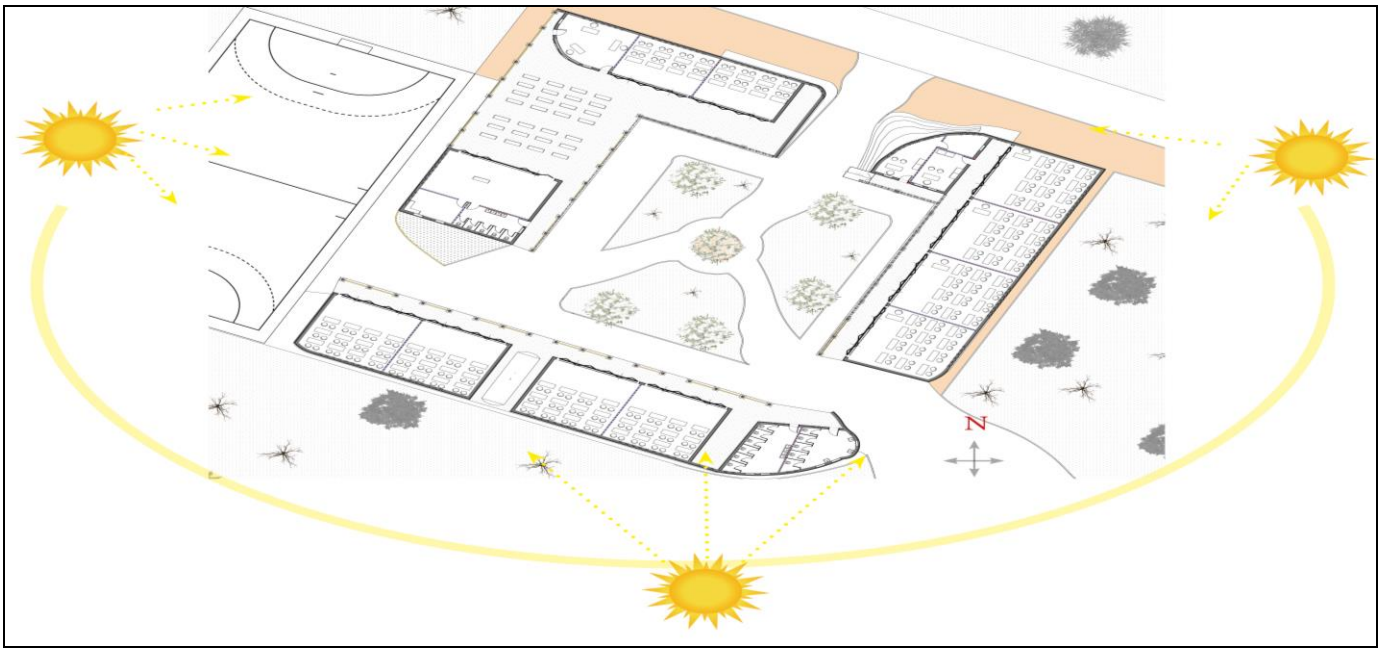

Fig 12: Sun Path

E. Materials and Construction Methods

- **Rammed Earth Walls**: A mix of local earth and organic fibers, layered and compacted for durability, with a finish of lime or clay plaster to protect against weathering.
- **Thatched or Tiled Roofs**: Built with lightweight bamboo or wood frames, the roofs provide effective insulation and facilitate rainwater collection.
- **Rainwater Harvesting**: Roof designs incorporate gutters to channel rainwater into storage tanks, ensuring a sustainable water supply for agricultural activities and daily use.


Fig 13: View of the Courtyard

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Fig 14: View of a Community Field

Fig 15: View of the Playground

Fig 16: View of the courtyard

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VIII. PERSPECTIVES AND CHALLENGES

➢ *The Women's Empowerment Project in Minawao Faces Several Challenges.*

- **Financial sustainability** is key, as the project depends on external funding.
- **Resource access**, especially water, is limited in this arid region.
- **Security instability** due to armed groups may disrupt operations.
- The **changing needs** of refugees will require ongoing adaptation of services.
- Maintaining **community engagement** is crucial for long-term sustainability and ownership.

IX. CONCLUSION

In conclusion, the design of the women's empowerment center for refugees in the Minawao camp provides a comprehensive and appropriate response to the multiple challenges faced by this vulnerable population. By utilizing local materials, respecting cultural specifics, and involving the community, the project offers concrete solutions in terms of vocational training and economic empowerment, while reinforcing the dignity of the women. Designed to be flexible and sustainable, it adapts to the evolving needs of the camp in a resource-constrained environment. This exemplary project highlights the crucial role architecture plays in fostering refugee resilience and self-sufficiency, transforming physical spaces while improving social and economic conditions.

REFERENCES

[1]. Albadra, D., et al. (2020). Resilient and Sustainable Shelter Design for Displaced Populations. Frontiers in Built Environment, 6, 55.

[2]. Bahgat, M. (2024). *Towards a Culturally Competent Humanitarian Assistance*. Centre for Humanitarian Leadership.

[3]. BRAC, 2018. *Safe Spaces for Women and Girls in Rohingya Camps*. [En ligne] Disponible à : https://www.brac.net/rohingya-crisis/

[4]. CARE, 2020. *Supporting Women's Livelihoods in Crisis*. Disponible à : https://www.care.org/our-work/womens-empowerment/livelihoods/

[5]. Club of Rome (1972). *The Limits to Growth*. Universe Books.

[6]. Chandramouli, S. (2020) Exploring the Architecture for a Community Shelter for Women in the Kashmir Valley Affected by Post-Traumatic Stress Disorder. Master's thesis, Texas A&M University.

[7]. Cornwall, A. (2002). "Making spaces, changing places: situating participation in development," *IDS Working Paper 170*, Institute of Development Studies.

[8]. Fathy, H. (1973). Architecture for the Poor: An Experiment in Rural Egypt. University of Chicago Press.

[9]. Folke, C. (2006). "Resilience: The Emergence of a Perspective for Social–Ecological Systems Analyses." *Global Environmental Change*, 16(3), pp. 253-267

[10]. Friedman, Y. (1975). *Toward a Scientific Architecture*. MIT Press.

[11]. Hassan, R. (2020). Community Centre for Rohingya Refugees. Journal of Humanitarian Architecture, 8(2), pp. 30-45.

[12]. Hassan, R., & Ahmed, M. (2022). Challenges in Sustainable Architecture for Displaced Populations. Asian Journal of Architecture, 11(1), pp. 22-34.

[13]. Heringer, A., & Zeigler, P. (2013). Architectural Sustainability and the Use of Local Materials. Journal of Sustainable Architecture, 7(2), pp. 45-58.

[14]. Holling, C.S. (1973). "Resilience and Stability of Ecological Systems." *Annual Review of Ecology and Systematics*, 4(1), pp. 1-23.

[15]. Hollmén, S., 2020. Now the Baobab Shines! Cultural Locality Interfacing with Interdisciplinary Pedagogies in Architectural Education. Aalto University School of Arts, Design and Architecture.

[16]. International Rescue Committee, 2019. *Women and Girls Safe Spaces: How They Help in Crisis Situations*. [En ligne] Disponible à : https://www.rescue.org/report/women-girls-safe-spaces

[17]. Jodidio, P. (2014). Shigeru Ban: Humanitarian Architecture. Taschen.

[18]. Johnson, B., et al. (2022). Addressing the Cultural Gap Between Humanitarian Assistance and Local Responses to Risk Through a Place-Based Approach. United Nations Sustainable Development.

[19]. Kellner, T., & Rauh, W. (2014). Challenges in Sustainable Architecture: Lessons from METI School. Building Research & Information, 42(4), pp. 468-477.

[20]. Martins, N., & Guedes, M. C. (2015) 'Humanitarian or Resilient Architecture for Vulnerable Communities?', *Proceedings of the 5th International Conference on Building Resilience*, Newcastle, Australia, 15-17 July.

[21]. Mazzurco, A. (2016). Methods to facilitate community participation in humanitarian engineering projects: Laying the foundation for a learning platform. Purdue University.

[22]. MacKeith, M. (2013). "Women's Opportunity Center by Sharon Davis Design." *Architectural Review*. Available at: Architectural Review

[23]. Oshinowo, T. (2021). Resilient Design: Addressing the Challenges of Displacement in Nigeria. Journal of African Architecture, 12(3), pp. 55-72.

[24]. Oxfam, 2020. *Protecting Rohingya Women and Girls in Bangladesh*. [En ligne] Disponible à : https://www.oxfam.org/en/protecting-rohingya-women-and-girls

[25]. Sinclair, C. (2006). *Design Like You Give a Damn: Architectural Responses to Humanitarian Crises*. Metropolis Books.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/IJISRT24OCT277

[26]. Serem, J. J. (2011) Architecture, Craftwork & Empowerment: A Craft Center for Maasai Women in Kajiado, Kenya. Master's thesis, University of Maryland, College Park.
[27]. Rahman, S., & Hassan, R. (2021). Participatory Design in Refugee Camps: Lessons from Cox's Bazar. Journal of Architecture and Society, 14(3), pp. 60-78.
[28]. UN Women, 2014. *Supporting Women's Shelters in Africa: KWIECO Shelter House Case Study*. [En ligne] Disponible à : https://www.unwomen.org/en/what-we-do/ending-violence-against-women
[29]. UN Women, 2018. *Women's Empowerment in Humanitarian Settings*. [En ligne] Disponible à : https://www.unwomen.org/en/what-we-do/humanitarian-action.
[30]. UN Women, 2019. *Creating Safe Spaces for Rohingya Women and Girls*. [En ligne] Disponible à : https://www.unwomen.org/en/what-we-do/humanitarian-action
[31]. UN Women, 2020. *Empowering Rohingya Women and Girls in Cox's Bazar*. [En ligne] Disponible à : https://www.unwomen.org/en/where-we-work/asia-and-the-pacific/rohingya-response
[32]. UNFPA, 2019. *Safe Spaces for Women and Girls in Humanitarian Settings*. [En ligne] Disponible à : https://www.unfpa.org/safe-spaces
[33]. UNHCR, 2021. *Camp de Réfugiés de Minawao - Cameroun*. [Disponible à : https://www.unhcr.org].
[34]. UNHCR, 2024. *Camp de Réfugiés de Minawao - Cameroun*. Disponible à : https://www.unhcr.org
[35]. UNICEF, 2024. *Education and Livelihood Programs in Minawao*. Disponible à : https://www.unicef.org/cameroon/education-minawao