Report

Assessment of the role of women's networks in promoting gender equality, women leadership development and knowledge sharing within the energy industry globally

SECTOR NETWORK
TUEWAS

Transport, Environment, Energy, Water in Asia

November, 2024

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS

COP .... Conference of the Parties
EIGE .... European Institute for Gender Equality
GEN .... Gender Energy Nexus
GIZ .... Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
GWNET .... Global Women's Network for the Energy Transition
HR................... Human Resources
IEA .... International Energy Agency
IFC .... International Finance Corporation
IPU .... Inter-Parliamentary Union
IRENA .... International Renewable Energy Agency
JET .... Just Energy Transition
OECD .... Organization for Economic Co-operation and Development
SDG 5 .... Gender Equality
SDG 7 .... Affordable and Clean Energy
SDGs .... Sustainable Development Goals
STEM............. Science, Technology, Engineering, and Mathematics
TUEWAS .... Transport, Environment, Energy and Water in Asia
UN WOMEN ... United Nations Entity for Gender Equality and the Empowerment of Women
UNFCCC .... United Nations Framework Convention on Climate Change
UNIDO .... United Nations Industrial Development Organization

EXECUTIVE SUMMARY

The energy sector has long been recognised for its under-representation of women, particularly in technical and leadership positions. However, including women is vital for a successful Just Energy Transition (JET), as they bring essential skills and unique perspectives that can shape effective strategies for JET. Therefore, promoting gender equality, leadership opportunities, and knowledge sharing within the energy sector is essential to empower women to actively contribute to JET initiatives.

Energy women networks have emerged as critical platforms for advancing these goals. These networks highlight the challenges women encounter in the energy industry and develop strategic solutions to overcome these barriers. By providing support resources, they empower women to overcome systemic barriers, advance their careers, and contribute to innovation within the industry.

The Gender Energy Nexus (GEN) Taskforce, under the Sector Network Transport, Environment, Energy and Water in Asia (TUEWAS) of GIZ, promotes the representation and leadership of women in the energy sector by providing best practices, knowledge on women's network operations, and gender-related policies and studies. To explore the role of energy women networks in advancing gender equality, leadership development, and knowledge sharing globally, GIZ engaged a local consultant to conduct this Study.

This Study examines:

- Gender inequalities in the energy industry

- Barriers limit women's access to opportunities to engage in energy transition

- Theory, framework, and indicators to assess the performance of women's networks in the energy industry

- The ability of energy women networks to reduce or remove gender inequalities in the energy industry.

- Recommendations, and best practices for community leaders and stakeholders in formulation or aiming to optimize operation and impact of women's networks in the energy industry.

Methodology

As this Study seeks to answer 02 questions below, it primarily looks at energy women networks and promoter organisations within the partner countries of TUEWAS while also expanding this Study's reach to regional and international networks:

- RQ1: How do "social motivations" and "career motivations" influence women's participation in energy women networks?

- RQ2: What is the efficacy of women's networks in contributing to gender equality, women leadership development, and knowledge sharing within the energy sector?

A qualitative study was designed which involved 17 interviews with representatives of 11 women's energy networks and 2 promoter organisations, analysing their operations and impacts. The insights were coded using MAXQDA software, emphasising authenticity and objectivity.

Key findings

Motivations for Participation

Women join these networks driven by both social and career motivations. Social motivations include the desire to connect, share experiences, increase visibility, and foster collective agency. Career motivations

encompass mentorship, networking, learning opportunities, and policy advocacy. These networks align their missions with these motivations to engage members effectively. Among these motivations, gender equality and sharing knowledge emerge as the top priorities while leadership development is also identified as a significant motivation.

Effectiveness of energy women networks in promoting gender equality, leadership development, and knowledge sharing

The energy women networks play an important role in promoting gender equality, leadership development, and knowledge sharing through several key factors. To reach these goals, the networks are effectively organised to ensure efficient resource utilisation through key factors such as structure, financial sustainability, committed membership, reputation, diversity, women's statistics, and impactful events and activities. They have established clear visions, missions, and goals that significantly align with members' motivations and broader socio-political objectives, providing a strong foundation for success. Their well-defined structures and governance frameworks have improved communication, collaboration, and resource management. Strategic financing, supported by diverse funding sources such as government sponsorships, corporate memberships, and volunteer contributions, has ensured the networks' long-term operations. Additionally, they have successfully built a committed membership base, achieving their target numbers while fostering member loyalty. Their strong reputation, coupled with strategic partnerships with industry, academia, and policymakers, has expanded their influence. Moreover, their inclusive approach, involving men and other groups in activities, has contributed to a more diverse and dynamic network.

With these crucial foundations, their activities and initiatives further enhance gender equality, leadership development, and knowledge sharing. Specifically, they use women's statistics to address gender disparities and organise events to empower women in the energy sector, including conferences, panel discussions, networking events, training, and mentoring

programs, site visits, communication campaigns, the sharing of success stories, research studies, and the dissemination of best practices. They also track the number of network members holding leadership positions within their respective organisations to measure their success in promoting leadership development. Leadership development is facilitated through a range of activities, including events, training courses, mentoring programs, and site visits, sharing success stories, and job-seeking support. Additionally, the networks facilitate knowledge sharing by implementing activities such as events, training programs, mentoring opportunities, site visits, research studies, and podcasts. At the same time, policy plays a crucial role in ensuring sustainable funding and the successful implementation of activities. It influences the effectiveness of energy women networks in addressing gender inequality, underrepresentation in leadership, and knowledge gaps. Therefore, they actively advocate for gender-responsive policies at both national and organisational levels to create a supportive environment that enables them to achieve their goals.

Recommendations

This Study emphasises the critical role of energy women networks in promoting gender equality, fostering women leaders, and facilitating knowledge sharing within the energy sector. To sustain and enhance these important impacts, recommendations focus on eight key effectiveness factors:

- Articulating a clear vision and goals that align with broader gender equality objectives.
- Maintaining a flexible structure to accommodate various stages of development.
- Diversifying funding sources while ensuring transparency and accountability.
- Prioritizing member engagement over mere membership numbers.
- Utilizing a centralized database for efficient data use and advocacy.
- Tailoring events to meet diverse member interests.
- Enhancing network reputation through various promotional channels.

- Developing strategic partnerships with clear objectives and engagement approaches.

Additionally, engaging with policymakers is crucial for advancing gender equality initiatives, and they can use the insights in this Study as the founda-tion of the necessity to design and implement gender-responsive policies, support women's networks, and provide relevant funding. Industry stakeholders and promoter organisations are encouraged to collect ideas from these findings to design programmes that address gender disparities and foster environments where women can thrive in technical and leadership roles. Given the importance of these findings, this report should be widely disseminated through targeted communication strategies to raise awareness and drive action toward gender equality, women leadership development, and knowledge sharing in the energy sector.
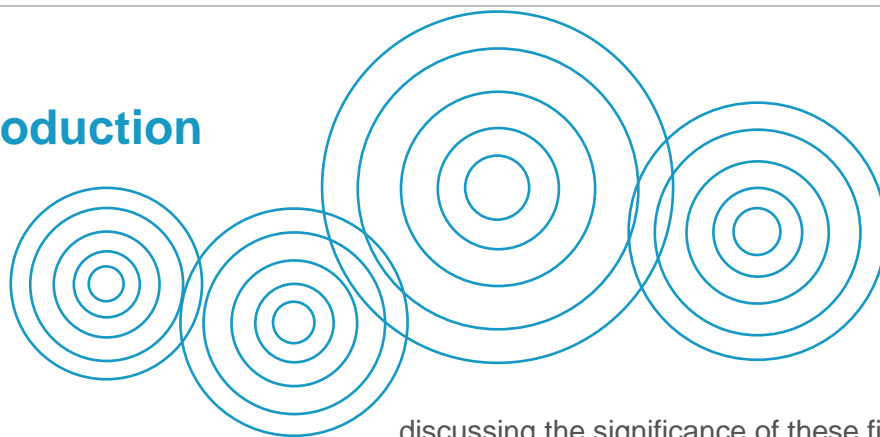
Chapter 1:
Introduction

Chapter 1: Introduction

1.1. About the Study

In recent years, women-led projects and initiatives have developed to reduce gender disparity and promote understanding of the impact of gender and diversity in sustainable development on a global scale. In the landscape of the energy sector, the Gender Energy Nexus (GEN) Taskforce is established under the framework of the GIZ internal sector network, namely Sector Network Transport, Environment, Energy and Water in Asia (TUEWAS) which is a regional network that promotes the exchange of knowledge and experience in the domains of Transport, Environment, Energy, and Water in Asia and the Pacific. The GEN Taskforce aims to promote the representation and leadership of women in the energy sector through providing best practices and knowledge on women's network operations and gender-related policies and studies in energy.

The GIZ engaged a local consultant to undertake a study to assess the role of women's networks in promoting gender equality, women leadership development, and knowledge-sharing within the energy industry globally (hereinafter referred to as the **Study**).

The purpose of this report is to articulate the conceptual design of the Study, including the context, objectives, scope, methodology, findings, discussion and recommendations of the Study. The Study involved an intensive phase, which involved reviewing relevant documents and publicly accessible resources related to women's networks in the energy sector. A qualitative approach was adopted, using in-depth interviews with members of women's energy networks and supporting organisations. The findings derived from the analysis of the interview data and the Study conclude by discussing the significance of these findings and proposing recommendations for network development and future research.

1.2. Structure of the Research Report

This report is structured as follows:

- Chapter 1: Introduction
- Chapter 2: Context and Objectives
- Chapter 3: Scope of research and Methodologies
- Chapter 4: Findings and Discussion
- Chapter 5: Conclusion and Recommendations
- Chapter 6: Limitations

1.3. Disclaimer

This document is intended for the sole purpose set out under Contract for appraisers and other service providers No. 83469350 dated 17 July 2024 between GIZ and the Local Consultant. Information contained in the report is current as of November 2024 and may not reflect any event or circumstances which occur after this date.

The results contained in the report are partly based on information that has not been generated by the Local Consultant and has not been entirely subject to our independent verification.

The analyses contained in the report are based on various assumptions that the Local Consultant has tested and developed, to our best knowledge, regarding energy women network development, which may be subject to development and changes from time to time.

Chapter 2: Context and Objectives

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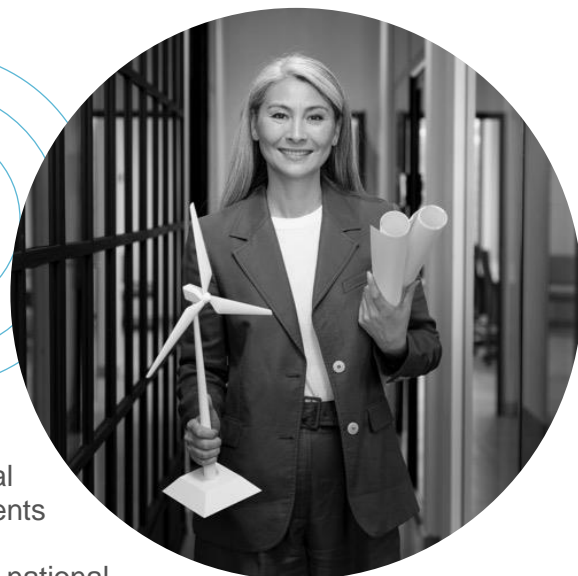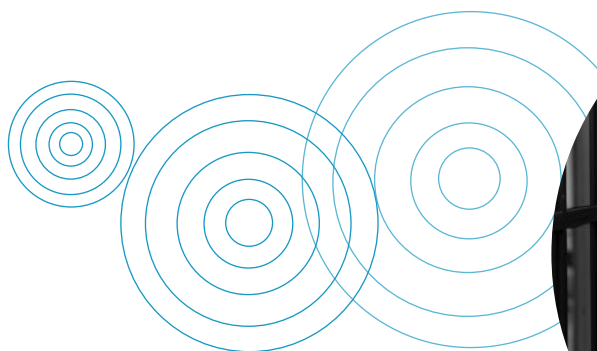
2.1. Context of the Study

2.1.1. Gender and just energy transition

To tackle climate change, a rapid decarbonization of the energy system is the solution to reduce carbon emissions and address global warming. While countries have made progresses in the energy transition, it has been widely acknowledged at the 28th meeting of the Conference of the Parties (COP) to the UNFCCC that the energy transition should be accelerated in "a just, orderly and equitable manner" (Summary of Global Climate Action at COP 28, 2023).

Research has revealed that gender equality and considerations on gender dimensions in the energy sector can advance the just energy transition (Tracking Gender and the Clean Energy Transition – Analysis - IEA, 2018). According to IRENA, jobs in the renewable energy sector and energy transition-related sectors will grow to 122 million in 2050. Renewable energy alone is expected to account for 43 million of these positions (World Energy Transitions Outlook, 2021). Evidence from reliable sources has shown that the presence of women in leadership positions enhances corporate responsibility; promotes innovation; boosts productivity; improve team leadership, motivation, performance; makes better use of available talent; and increases profits (Women for Sustainable Energy: Strategies to Foster Women's Talent for Transformational Change, 2019). Therefore, bolstering female involvement within the energy sector is critical, as it serves both to meet the demands of the labor market and to improve corporate performance. There has been a growing trend of integrating gender perspectives into multilateral commitments among countries, national energy transition policies and initiatives by international organisations and development funds (Giner-Reichl & Veldhuizen, 2023). For example, the gender dimension has been integrated into a multilateral commitment by 191 United Nations member states to the Sustainable Development Goals (SDGs), including SDG 5 (gender equality) and SDG 7 (affordable and clean energy). As the SDGs are intended to form a multidisciplinary linkage, a gender just energy transition can serve at least eight SDGs (Clancy & Feenstra, 2019). That said, in reality, the world is lagging in its commitment to achieving the stipulated SDGs by 2030 when one in every seven countries is significantly behind in achieving at least a quarter of the SDG 5 indicators (Bhatt, 2022).

Despite the effort of reducing gender disparity in the energy professions, there are gender gaps in (i) the proportion of women working in the energy sector, (ii) women's participation in energy-related education, and (iii) women's influence in decision-making. Firstly, regarding the proportion of women working in the energy sector, according to IEA, the energy sector is deemed as a "male-dominance" field when women only account for 16% of the traditional energy sector, hold 32% in renewable energy and 22% in old and gas workforce globally (Ferroukhi et al., 2019). Women are significantly under-represented in high-level positions within the energy sector when they account for only 5% of chairs of the board, CEO, and president (Women in Senior Management Roles at Energy

Firms Remains Stubbornly Low, but Efforts to Improve Gender Diversity Are Moving Apace – Analysis - IEA, 2021) while over-represented in administrative and low-qualified roles, comprising 45% of these positions (Ferroukhi et al., 2019). A study by IFC in 2022 invited 64 companies specializing in solar, wind, hydro, biomass, and geothermal power generation for both on-grid and decentralised systems to respond to the employers' survey, both male and female managers and employees explained that women "naturally" prefer office work for reasons that include: "women are better suited to administrative work, women lack the physical fitness for energy sector jobs, women prefer jobs that are comfortable, and women want to work in a location that is close to their family" ("Women's Participation in the Renewable Energy Workforce in Sub-Saharan Africa: Identifying Barriers and Opportunities for Women as Leaders and Employees," 2022). Given most technical occupations have historically been associated with men in the energy sector, there is a common misconception that jobs require greater physical strength than most women possess or are too hazardous for women. For example, according to a report on the hydropower sector of the World Bank in 2023, the majority of women (79%) work in non-technical areas (administrative, commercial, sales, marketing, human resources, and finance) with just 21% holding technical or engineering roles (World Bank, 2023). Secondly, regarding women participation in energy-related education, only 33% of female tertiary graduates in OECD countries come from these traditionally male-dominated STEM fields (OECD, 2023). Third, when it comes to women's participation in energy-related policies, UN Women and IPU data from 2023 show that only 11% of ministerial positions related to energy, mining and natural resource fuels in 190 nations are held by women (Women in Politics: 2023, 2023). At regional level, only 26% of senior decision-making positions in national ministries responsible for the environment, transport, and energy in the European Union were held by women. Specifically, the energy sector exhibited the lowest female participation rate at 17% (The European Institute for Gender Equality Annual Report 2012, 2013)

The convergence of skill gaps and a lack of experience has created a complex challenge for women seeking to enter and advance in the energy sector. IRENA's findings underscore this point, revealing that women encounter similar obstacles at both the entry and advancement stages of their careers, including cultural and social norms, a lack of workplace flexibility, and insufficient representation in decision-making roles, often referred to as the "glass ceiling" (Ferroukhi et al., 2019). Although occupational barriers are common across industries, the growing need for human resources in the renewable energy sector and the distinct contributions of women underscore the necessity of ensuring equitable access to this field. Skill gaps, cultural and social norms, lack of workplace flexibility, and the "glass ceiling" are among the key barriers hindering women's progress in the energy sector. If the energy industry fails to make significant strides towards gender equality, and without proactive measures to identify and overcome those barriers women face, the gender gap in the proportion of women working in the energy sector, women's participation in energy-related education, and women's influence in decision-making as mentioned above will likely expand as the industry grows, hindering the just energy transition.

2.1.2. Women's networks in the energy industry

According to IRENA, creating supporting networks is one of the most frequently endorsed measures to combat gender disparity (Ferroukhi et al., 2019). As opportunities for women in male-dominated areas are limited, it is important that women have a supporting network of like-minded people having similar backgrounds and facing similar challenges in accessing career advancement opportunities so that they can exchange knowledge, receive support, and make meaningful connections. Historically, women had difficulty entering the energy labour market and advancing in their careers due to lack of support, stereotypes, social psychological barriers, conditions of employment and promotion (Hanek & Garcia, 2022). To counteract these challenges, given the importance of women's network for career advancement, the creation of formal women's networks within organisations began (Ibarra, 1993).

2.1.3. Previous studies on women's networks

Gender equality issues have been established and addressed in academia and practice (Addabbo & Militello, 2023). In these studies, women's networks are referred to and discussed briefly as a solution to empower and support women. Furthermore, there are certain studies relevant to effectiveness of women's networks such as:

- Closing the renewable energy gender gap in the United States and Canada: The role of women's professional networking (Allison et al., 2019)

- The effectiveness of an in-company women network – a case study at the RWE Group (Waberg, 2016)

- Promoting the role of women in sustainable energy development in Africa: Networking and capacity-building (Makhabane, 2002)

- Do women's networks help advance women's careers? Differences in perceptions of female workers and top leadership (O'Neil et al., 2011)

- Understanding the Role of Networks in Collective Learning Processes: The Experiences of Women (Cross & Armstrong, 2008)

The studies mentioned above help frame concepts and develop ideas on the effectiveness of women's networks in general and women's network in energy industry in particular. However, these studies are generally limited in terms of territory (regional or local) or limited in scope (in-company women's network rather than an encompassing network). Therefore, it is necessary to explore further this topic in a comprehensive manner and in the context of energy transition on a global scale.

2.2. Objectives of the Study

Against the above context, this Study serves two main purposes:

Firstly, to assess the effectiveness and impact of operating energy women networks worldwide on promoting gender equality, women's leadership development, and knowledge sharing in the energy sector. There is a strong consensus in academia and practice that women's networks play an important role in their members' career advancement, skill development, and the overall representation of women in decision-making positions (Allison et al., 2019; Clancy & Feenstra, 2019; Waberg, 2016). However, there is a lack of studies on women's networks in the energy sector and their effectiveness in factors such as establishment, development, and maintenance. Thus, more practical insights from a variety of views (covering from network members to board members) on the goals and expected outcomes of women's networks are needed.

Secondly, to provide best practices and recommendations for networks in formulation or aiming to optimise operation and impact of women's networks in the energy industry. We have observed the establishment of several women's networks in the energy sector worldwide. While some of them are very active and have positive impact in their communities, there are some networks showing signs of inactivity or termination of operation. Thus, given the roles of women's networks in the energy industry, it is important to highlight successful case studies and identify elements that make a women's network effective. Therefore, this Study will focus on development journeys of women's networks in the energy industry to identify and describe best practices, recommendations for community leaders and stakeholders in establishing, developing, and maintaining women's networks that can make positive changes to address gender inequalities and foster just energy transition.

Chapter 3:
Scope of research and Methodologies

Chapter 3: Scope of research and methodologies

3.1. Scope of the Study

To achieve the objectives of the Study, we have identified the scope of this research as follows:

- Gender inequalities in the energy industry.

- Barriers limit women's access to opportunities to engage in energy transition

- Theory, framework, and indicators to assess the performance of women 's networks in the energy industry.

- The ability of energy women networks to reduce or remove gender inequalities in the energy industry.

- Recommendations and best practices for community leaders and stakeholders in formulation or aiming to optimise the operation and impact of women 's networks in the energy industry.

3.1.1. Women's networks and the role of women's networks in promoting gender equality, women leadership development, and knowledge sharing within the energy sector

Women in the energy sector

The energy sector has long been male-dominated, with women significantly under-represented, especially in technical and leadership roles. Despite global efforts to address this imbalance, women continue to face numerous barriers to entry and career advancement, including skill gaps, gender biases, limited experience, and restrictive cultural and social norms. These challenges hinder women from fully contributing to the sector, particularly in positions where their unique perspectives and expertise could foster innovation and drive progress. However, as highlighted by UN Women and UNIDO (2023), achieving a Just Energy Transition (JET) requires the full and equal participation, leadership, and decision-making of women and girls (UN Women & UNIDO, 2023). This makes the advancement of women's roles in energy essential for the success of JET. Advancing women's inclusion in the energy sector requires a comprehensive approach, including increasing women's participation, promoting them to leadership positions, and building their capacity to access valuable opportunities within the industry. To support these objectives, promoting gender equality, leadership development, and knowledge sharing within the sector are crucial. To address these, established women's networks have contributed effective practices in these areas, providing platforms that help women overcome social barriers and promote professional growth.
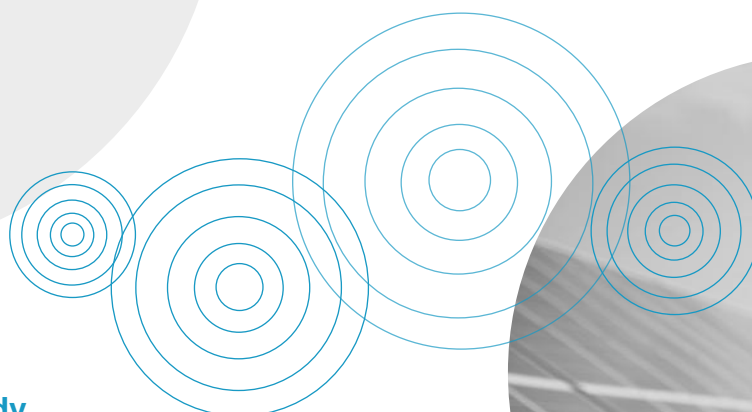
Motivations of women to involve networks in the energy sector

As identified by Singh et al. (2006), key motivations for women joining these networks include social and career motivation. Social motivation focuses on meeting with other women (without specifying why), driving change to promote gender equality, supporting others, and sharing experiences. Career motivation includes gaining support, knowledge sharing, mentorship, role modelling, leadership development, networking, improving career prospects, and learning and development. Given these motivations, the aim of women's networks should align with these expectations to serve their members and the future-orientated declaration of the network's purpose (Singh et al., 2006). Thus, evaluation of the role of these networks in advancing gender equality, leadership development, and knowledge sharing is vital for dismantling obstacles in the energy sector.

Role of women's network in promoting gender equality, women leadership development and knowledge sharing within the energy sector

Definition and types of women's networks

Singh et al. (2006) refer to networking as "activities by individuals attempting to develop and maintain relationships with those with, or perceived to have, the potential to assist them in their work or career." Vinnicombe and Colwill (1995), in their research on the essence of women in management, defined networking as "the banding together of like-minded people for the purposes of contact, friendship, and support." According to Travers et al. (1997), women's networks fall into three main types: professional and occupational networks, in-company networks, and training networks. Bierema (2005) further suggests networks can either be informal or formal, noting that the only women's networks tend to be formal. An energy women network, as defined by GWNET (2022), is a professional association of women centered on energy in a specific location offering a variety of activities for its members. The network may be in the format of a non-profit entity or an

"initiative" or "programme" within an already established legal entity or another format allowed by national or regional legislation GWNET (2022). These networks help women integrate into male-dominated fields, facilitate knowledge sharing, and play a crucial role in managerial behaviour and career success (Bierema, 2005; Durbin, 2010; Singh et al., 2006).

Objectives of women's networks in the energy sector

The alignment between the networks' objectives and their members' motivations, along with their ability to adapt to specific national or regional challenges related to gender barriers and the just energy transition, significantly contributes to their success.

According to GWNET (2022), these networks commonly focus on three main objectives: promoting gender equality, leadership development, and knowledge sharing. To advance gender equality, these networks engage in advocacy to raise awareness about the value of gender diversity and to promote policies that support women's participation. In terms of leadership development, networks focus on empowering women to advance their careers by providing essential resources, mentorship, and support systems tailored to professional growth within the energy industry. By increasing the visibility of women in leadership roles and showcasing their contributions, these networks foster a shift in cultural perceptions and offer role models for future generations of women in the field. Additionally, knowledge sharing is achieved through networking and educational initiatives. These networks create opportunities for women to connect, share experiences, and build supportive professional relationships, which strengthen the community and enhance collaboration. Workshops, mentorship, and specialised training programs provide members with the latest industry insights and skill-building opportunities, enabling them to remain competitive and well-prepared for career advancement.

The objectives of women's networks, which are reflected in the network's vision, mission, and

strategic plan, drive the design of impactful activities tailored to address barriers and support women in their energy sector careers. Evaluating the effectiveness and real impact of these activities is essential to ensure continued progress and relevance in the sector.

Effectiveness of women's networks in the energy sector

The effectiveness of women's networks in the energy sector can be evaluated through five key aspects: business effectiveness, membership, women's positions, events and other activities, and network reputation. These aspects are adapted from research by Singh et al. (2006), Malik (2011), and Waberg (2016), with modifications to tailor them to this context.

First, business effectiveness measures how well a network supports its members' professional development and career success. This includes assessing the achievement of the mission, vision, and goals of a network proposed by Malik (2011) which provides a sense of direction and clarity regarding the desired future state of the organisation, as well as its reason for existing. Network structure, as conceptualised by Waberg (2016), emphasises the roles of steering groups, sponsors, and subnetworks, which will be incorporated to make a more comprehensive assessment. Human resources (HR) audit is another important factor, revealing how well the network manages its personnel to reach its goals. Sponsorship achievement is critical, as consistent financial backing ensures sustainable network operations and continued delivery of services for members.

Second, an engaged membership base is a key indicator of network success, as highlighted by Singh et al. (2006). Membership numbers and achievement of membership targets show the network's growth, reflecting its appeal and value.

Third, the representation of women, particularly in leadership roles, is an important indicator of the network's impact on career advancement. Tracking gender statistics at various levels including the Board as mentioned by Singh et al. (2006) provides a measure of the network's impact on gender equity. Networks that enable women to achieve board or executive positions highlight their success in overcoming gender barriers within the industry.

Fourth, events and other activities play a vital role in fulfilling the network's mission. Singh et al. (2006) identified events as a core element of network effectiveness. Tracking the number of events, training days, and member surveys helps evaluate how well the network's offerings meet members' needs and expectations. Additionally, gathering success stories and monitoring mentoring relationships established within the network showcase the network's practical support for members' growth and achievements.

Fifth, the network's reputation - measured by awards, media coverage, publications, and invitations to speak or partner with other organisations - further underscores its credibility and influence in the industry. While Singh et al. (2006) initially incorporated these reputation elements under the factor "events and other activities," this Study recognises their distinct significance and moves them into an independent factor.

The combined and adapted effectiveness factors are presented in Figure 1.

Figure 1: Propose factors of network effectiveness
(Singh et al., 2006; Malik, 2011; Waberg, 2016)

Membership
Membership numbers
and meeting targets
for membership

Business
effectiveness
Objective achieved
Network structure
and HR audit
Sponsorship achieved

Women
positions
Gender statistics at
various levels
including the Board

Effectiveness
factors

Network
reputation
Awards, media coverage,
publications, invitations
as external speakers/partners...

Events
and other activities
Number of events including
training days, surveys of
members, success stories of
women achieving, number of
mentoring relationships
established

3.1.2. Initial model to assess the role of energy women networks

The interconnection between network effectiveness and women's motivations underpins the model presented in Figure 2, which is designed to assess the role of women's networks in advancing gender equality, fostering women's leadership development, and facilitating knowledge sharing within the energy sector.

Figure 2: Propose model to assess the role of energy women networks in promoting gender equality,
women leaderships development, and knowledge sharing
(Singh et al.,2006; Malik, 2011; Waberg, 2016)

Career motivation
gaining support
knowledge sharing
mentors, role models
meeting senior women, networking
improving career prospects
learning and development

Motivation
to invovle

Social motivation
connecting with other women
the want to drive change
support others and
share experiences

Membership
Membership numbers
and meeting targets
for membership

Business
effectiveness
Objective achieved
Network structure
and HR audit
Sponsorship achieved

Women
positions
Gender statistics at
various levels
including the Board

Effectiveness
factors

Network
reputation
Awards, media coverage,
publications, invitations
as external speakers/partners...

Events
and other activities
Number of events including
training days, surveys of
members, success stories of
women achieving, number of
mentoring relationships
established

3.2. Methodologies of the Study

The methodologies of the Study include: qualitative research, interviews, and data collection.

3.2.1. Research approach, design and data collection

A qualitative research method is applied to comprehensively address the research objectives, allowing for an in-depth exploration of the perceptions and experiences of those directly involved with and experiencing the phenomenon. Through our review of documents and analysis, this Study focuses on a deeper understanding of the research questions. It follows the principles of qualitative research using gender analysis as follows (Drapper, 2004):

- Theoretical basis: to establish a theoretical framework and describe and explain social phenomena as they occur considering women' s perspectives, concerns and the context/environment in which they are living.

- Assessment and insight generation: by collecting data and reviewing documents, the Study creates a hypothesis, theory, and insights. In addition to knowledge formulation, the Study also involves recommended actions toward changes in gender inequalities.

The two research questions were developed through a comprehensive review of existing studies. The interview method is semi-structured involving guidance from the interviewer while allowing for flexibility proposed by the interviewee (Magaldi & Berler, 2020). Targeted interview questions will be prepared to collect information about the networks' accomplishments, difficulties, and activities. That said, open-ended questions are inclusive to ensure that the participants will be encouraged to discuss their experiences and points of view openly. The methodology avoids questions that would lead to bias in the responses to preserve objectivity.

Note: For the promoter organisations, there are a total of 9 interview questions. The first 6 questions focus on similar effectiveness factors as those asked to energy women networks, covering topics about business effectiveness, membership, women's positions, events, and other activities. Additionally, the promoter organisations have a separate section with 3 extent questions, marked with an asterisk (*), which specifically address sustainability and partnerships.

Table 1: Research Table

Research Objectives	Research Questions	Interview Questions	Sources
RO1 To assess the effectiveness and impact of operating energy women networks worldwide on promoting gender equality, women leadership development, and knowledge sharing in the energy sector	**RQ 1** How do "social motivations" and "career motivations" influence women's participation in energy women networks?	1. What motivates women to participate in the energy women network? 2. How important is "social motivations" such as connecting with other women, wanting to drive changes, and sharing experiences, in influencing women's participation in an energy women network? Please give us one example. 3. How important is "career motivations" such as knowledge sharing, having mentors and role models, and improving career prospects, in influencing women's participation in an energy women	Singh et al., 2006

		network? Please give us one example.	
	RQ 2 What is the efficacy of women's networks in contributing to gender equality, women's leadership development, and knowledge sharing within the energy sector?	**Business effectiveness** 4. What are the vision, mission, and goals of your energy women network? How important are these in influencing the network's effectiveness? 5. How has joining the energy women network helped women in promoting gender equality, women leadership development, and knowledge sharing? Please give us one example. 6. Could you please describe your energy women networks' structure (e.g., steering group, network sponsors, and the potential for subnetworks)? Has your energy women network conducted an HR audit? 7. How does having a clear network structure across different departments impact the network's effective operations? 8. What are the primary funding sources for your energy women network (e.g., sponsors, members, crowdfunding)? How important are these in influencing the network's effectiveness? **Membership** 9. What is the current membership number of your energy women network and has it reached the target membership number? **Women positions** 10. How does your energy women network contribute to advancing women into leadership positions? **Events & other activities** 11. What types of events and other activities (e.g., member surveys, success stories, mentoring programs) does your energy women network organise to promote gender equality, women's leadership development, and knowledge sharing? 12. How would you assess your energy women networks' reputation	Malik, 2011 Waberg, 2016 Singh et al., 2006

		(Awards, media coverage, publications, invitations as external speakers/partners,...) in promoting gender equality, women's leadership development, and knowledge sharing?	
		Extent Question	
		13. Which other factors, beyond Business effectiveness, Membership, Women positions, and Events & other activities, contribute to an energy women network's effectiveness in promoting gender equality, women's leadership development, and knowledge sharing within the energy sector?	
		(*) Extent Question for Promoter Organisations	
		14. What action, if any, have energy women networks taken to ensure their sustainability beyond your organisation's support?	
		15. What actions, if any, has your organisation taken to ensure the sustainability of energy women networks after the end of the project/funding?	
		16. What actions, if any, has your organisation implemented to foster partnerships with the private sector/other donors/organisations to strengthen energy women networks?	

3.2.2. Sample selection

This Study employed purposive and snowball sampling techniques. To review the operation and assess the effectiveness of women's networks in the energy industry, up to 17 interviews with representatives of 11 women's energy networks and 2 promoter organisations were conducted. Promoter organisations selected will be those experienced in equitable development across different countries. They have expertise in gender equality and development, and provide a neutral perspective on the assessment of women's networks. To ensure representativeness of the data, a set of selection criteria for organisations and personnel within such organisations is established based on the theoretical framework and observations in

practice. Regarding organisation selection, the criteria include history, size, breadth of activities, and geographic location. Additionally, to ensure comprehensive data collection, networks with diverse geographic scopes have been selected. The focus is on organisations within the partner countries of TUEWAS while also expanding this Study's reach to regional and international networks.

A total of 17 interviews were conducted virtually in English over one month, from September 13th, 2024, to October 25th, 2024, using the Microsoft Teams platform to accommodate participants' schedules and geographical diversity. Initial contact with participants was made via Microsoft Outlook email. Each interview lasted approximately 30 to 90 minutes. Moreover, the interviews were conducted in

three types: group interviews, individual interviews, and email interviews.

With participants' consent, all interviews were recorded and then transcribed verbatim to capture the participants' responses accurately. Transcripts were anonymized to ensure confidentiality and securely stored for subsequent analysis. In addition, Microsoft Word's built-in speech-to-text feature was utilised to facilitate the transcription process. The following table provides details of the interviews, including information about each network, interview type, geographical scale, and interviewee's position.

Table 2: Respondent Overview

Respondent	Geographical Scope	Interviewee's position	Activities	Interview type	Platform
R1	Worldwide	Head	Empower, motivate, inform, inspire and connect women working in the energy sector	Individual	Microsoft Teams
R2	National	Managing director	Connect, Empower, Change	Individual	Microsoft Teams
R3	Worldwide	Founding member & Executive Director	Interdisciplinary networking, advocacy, training, coaching and mentoring	Group	Microsoft Teams
R4	Regional	Director	Women's economic empowerment, Advocay & Awareness raising, Gender mainstreaming, Research, Innovation, Partnerships	Group	Microsoft Teams
R5	National	Consulting Advisor	Roadmap, Scholarships, Business Article	Individual	Microsoft Teams
R6	National	National Chapter Senior Officer	STEM Education; Recruitment; Professional Development; Retention; Policy and Institutional Change	Individual	Microsoft Teams
R7	National	Hydrogen Officer	Connect, Empower, Change	Individual	Microsoft Teams
R8	Worldwide	President & CEO	Awards, Conferences, Events, Initiatives, Opportunities, Surveys	Individual	Microsoft Teams
R9	National	Founder and Director	Dialogue, Discussions, Professional events, Mentoring, Employment opportunities	Individual	Microsoft Teams
R10	National	Deputy Director (Technical)	Empower women in the workforce, Provide training and learning opportunities: conferences for	Individual	Microsoft Teams

			employees, professional events for universities, Create a favorable environment and introduce new initiatives		
R11	Regional	Founder	Career Development, Belonging, Visibility, Female representation, Business connection, Social impact	Individual	Microsoft Teams
R12	National	Board member	Training, conduct gender studies, promote connection and cooperation with domestic and international organisations	Group	Microsoft Teams
R13	National	Board member	Training, conduct gender studies, promote connection and cooperation with domestic and international organisations	Group	Microsoft Teams
R14	National	Member	Training, conduct gender studies, promote connection and cooperation with domestic and international organisations	Individual	Microsoft Teams
R15	National	Chairperson	Awareness, Economic empowerment, Awareness for mitigation climate, Advocacy	Individual	Microsoft Outlook
R16	National	Project Director	Promotion gender equality within the company and as an active contributor to gender equality	Individual	Microsoft Teams
R17	National	Deputy Director	Support workforce participation of women in energy projects and institutions, and promote normative change regarding women and girls	Individual	Microsoft Teams

Source: Website of profiled organisation

3.2.3. Data analysis

Qualitative research consists of three primary processes: conducting interviews, observing participants, and collecting documents. Data analysis in this approach involves organising information into categories and creating a coding framework. Codes are developed based on keywords, this Study's research questions, and the connections identified within the data.

MAXQDA software is utilised to code and structure the data. The final steps involve presenting this Study's findings and documenting them, with direct quotes from participants included to maintain authenticity.

Chapter 4: Findings and Discussion

Chapter 4: Findings and Discussion

4. Findings and Discussion

The purpose of this section is to present the Study's findings and interpret these findings in relation to the research questions, exploring how social and career motivations drive women's participation in energy networks and assessing the network's impact on key goals, including gender equality, leadership development, and knowledge sharing. The data collected from the interview will be compared with the factors in the initial model as presented in Chapter 3.

Figure 3: Word Cloud Documents

4.1. Motivations

Findings

4.1.1. Social motivations

In-depth interview responses reveal that all interviewed network members recognised the importance of social motivations in encouraging women to join energy women networks, particularly in sectors where they are underrepresented. Participants identified several primary social motivations, ranked by frequency of mention as follows: meeting others (R2, R3, R4, R10, R11, R12, R13, R14, R15), commitment to gender equality (R1, R2, R7, R8, R10, R11, R13, R14), sharing experiences (R2, R4, R6, R10, R12, R13, R14, R15), supporting other women (R1, R2, R3, R4, R10, R11, R13, R14), increasing visibility (R3, R6, R7, R8, R15),

building self-confidence (R5, R10, R13, R14, R15), and fostering collective agency (R4, R15).

The research further revealed emerging social motivations not covered in the initial literature, such as increasing visibility (R3, R6, R7, R8, R15), building self-confidence (R5, R10, R13, R14, R15), and fostering collective agency (R4, R15). The motivation to gain visibility is achieved through their platform, as exemplified by R3, *"We have this (platform's name) platform where people can create their profiles and that gives them visibility to the energy sector in general".* R8 also emphasised the importance of visibility, highlighting that women's networks offer a stage to showcase their empowerment, stating, *"giving women a stage and demonstrating empowerment, expressing a desire to see more women represented at leadership levels."* Building self-confidence was also a key motivator, mentioned by various interviewees as *"overcoming self-doubt"* (R13), *"building confidence"* (R5, R10, R15), and *"recognising potential"* (R14). Finally, fostering collective agency was highlighted by two networks (R4, R15), with R4 noting that *"rather than standing alone, when they come together, they feel much stronger, what we call collective agency, to actually express themselves and voice their issues within organisations."*

Several participants (R1, R5, R7, R9, R10) directly acknowledged the role of social motivations in their ongoing involvement in energy women networks. R5, for example, highlighted the value of shared professional insights, explaining that connecting with others across different regions helps members access essential information and resources, encouraging them to engage more actively in the network's activities.

4.1.2. Career motivations

On the career front, learning and development, a primary motivation noted in the initial model, was highlighted (R1, R4, R6, R7, R8, R9, R10, R11, R12, R13, R15). Sharing knowledge was also a key driver for joining the network, with many respondents, including R1, R6, R7, R8, R9, R10, R11, R12, R13, R14, and R15, emphasising its importance. Mentorship and accessing to role models (R1, R2, R3, R5, R6,

R10, R11, R12, R13, R15) and networking (R1, R2, R5, R7, R8, R9, R11, R12) were frequently cited as a motivation. Additionally, leadership development was a significant motivator, as mentioned by R6, R11, R13, R14, and R15. Improving career prospects was specifically highlighted by several interviewees (R1, R2, R12, R13, R15) as a critical benefit of network involvement. Gaining support was another essential career motivation noted by R1, R4, R5, and R7, who valued the encouragement and assistance offered by the network. Finally, a new career motivation, policy development, was mentioned by R10 and R14. R10 explained that policy development involves *"advocates for the improvement of working conditions and supportive legal frameworks for women, like organisation being created, woman-friendly environment, supportive workplaces."*

Discussion

The motivations play a key role in encouraging women to join the energy women networks. Interviews revealed three new social motivations that had not been previously identified in earlier research by Singh et al. (2006), including visibility, self-confidence, and collective agency. Conversely, all career motivations identified in Singh et al.'s framework were validated by interview responses. Additionally, policy development emerged as a career motivation from the interviews. The findings emphasised that women's motivations to join the energy women networks are dynamic and can evolve in response to challenges specific to the energy industry. The motivations not only encourage women to join the networks but also maintain their active participation in the network's activities. Due to the Study's limited sample size, additional motivations may not have been captured. Nevertheless, the primary motivations identified in the literature and interviews appear to be the strongest factors influencing members' engagement with energy women networks.

4.2. Effectiveness factors

4.2.1. Vision, mission, and goals

Findings

The significance of mission, vision, and goals for network success was highlighted by R1, who asserted that a clear mission, vision, and goals are crucial for achieving impact, as they provide direction and help engage the target audience effectively. R12 further explained that the mission, vision, and goals represent the *"shared aspiration of all our members participating in the network and to draw conclusions about what we have to do, how we do it to achieve."* R14 noted that these foundational elements *"directly influence [the network's] direction."*

The findings reveal that the vision, mission, and goals significantly align well with the motivation of energy women networks' members. The most commonly addressed motivation in the mission, vision, and goals of these energy women networks is the improvement of career prospects (R2, R3, R4, R5, R8, R10, R11, R14, R15), followed closely by promoting gender equality (R2, R3, R4, R6, R7, R10, R14, R15). Knowledge sharing (R3, R5, R10, R12, R13, R14, R15), supporting others (R2, R3, R5, R9, R10, R12, R13), and leadership (R2, R4, R5, R8, R11, R15) are also central motivations addressed by these networks when defining their mission, vision, and goals. Other less common motivations are visibility (R6, R7, R8, R10, R14), learning and development (R3, R12, R13, R14, R15), opportunities to connect with others (R2, R3, R12, R13, R14), policy development (R3, R4, R15), sharing experiences (R12, R13), mentorship and role models (R3), and networking (R3).

R13 noted the need for alignment with global, national trends and sustainable development, explaining, *"we must adopt a broader perspective, looking beyond our immediate circles and aligning our efforts with global trends."* and *"we need to ensure that our initiatives are aligned with this broader context and contribute to the sustainable development of our country."*

From the promoter organisation's perspective, R16 emphasised the importance of establishing a clear vision and mission from the outset, noting that: *"from the beginning on, this was one of the first tasks to create the vision and mission. It can be adjusted, but this needs to be clear always where the goals are and where you want*

to go." R16 further highlighted the need for alignment between the network's goals and predefined indicators, explaining that if the network's direction diverges significantly, *"then there's a discrepancy, and we need to address this."* R17, an energy women network, echoed this sentiment based on their experience working with their promoter. They shared, "*The mission, vision, and goals in an energy women network are crucial… this is the driving key of organisational support decisions. So that is why we are working on it."*

Discussion

A well-defined mission, vision, and goals that reflect both the aspirations of members and broader socio-political objectives enable a women's network to build a sustainable and impactful roadmap for promoting gender equality, nurturing women's leadership, and enhancing knowledge sharing. As noted by (Malik, 2011) and affirmed by interviewees R1, R12, and R14, a clear mission, vision and goals provide essential guidance on the network's desired future state, allowing it to channel resources effectively to advance these core objectives. By establishing a focused mission, vision, and goals, the network is better equipped to design initiatives that directly address barriers women face in the energy sector, such as gender imbalances (R7), limited access to advancement resources (R6), social norms (R11), and underrepresentation of women in the energy field (R8, R9).

The vision, mission, and goals also create a foundational structure that meets the diverse motivations of network members, including gender equality (R2, R3, R4, R6, R7, R10, R14, R15), knowledge sharing (R3, R5, R12, R13, R14, R15), and leadership development (R2, R4, R5, R8, R11, R15). Furthermore, the effectiveness of a women's network is further enhanced when its mission, vision, and goals are aligned with broader national and international objectives on gender equality and workforce diversity (R13). By integrating both global and local contexts, these networks can develop programs that resonate across multiple levels, enhancing their impact and relevance.

4.2.2. Network structure and HR audit

Findings

The findings from the analysis indicate that a clear structure of the network significantly influences the effectiveness of energy women networks. Interviewed members widely agreed that a well-defined network structure enhances overall performance. Specifically, clear structures contribute to improved greater collaboration (R1, R8, R10, R13, R14), effective resource management (R1, R10, R11, R12), communication (R1, R11), and increased innovation (R10). Additionally, these structural advantages help in securing funding and donations by ensuring accountability and transparency (R3, R4). Moreover, the structure of the energy women network should be developed based on their objectives (R4, R7, R12).

While almost all interviewed networks have their own structure, some networks such as those represented by R2 and R9 lack clear structures due to their nascent stages. Similarly, R1 and R11 have not detailed their structures; R1 is in the initial phase as an initiative, and R11 is a newly established network.

The findings reveal several key roles within the network structure, highlighting a diverse and strategic approach to the organisation:

- Leadership and Management Roles: Board of directors (R2, R7, R8), General Assembly (R3, R15), Board (R5, R9) , Executive committee (Steering committee) (R6, R10, R12, 13, 14)

- Steering and Coordinating Bodies: Coordination team/ Coordinator (R1, R5), Governing board (R3), Secretariat (R3, R4, R5, R12, R13, R14), Advisory group/ committee (R4, R8, R15), Working Group (R2, R7, R9, R12, R13, R14).

- Sponsors: R1, R3, R4, R6, R8, R9, R10, R11, R12, R13, R14, R15 mentioned the sponsor. R2 and R7 noted the absence of sponsors in their network.

- Subnetwork: Subnetworks exist within the structures of R2, R7, R8, and R10.

In addition to developing structure, the HR audit was also mentioned in the responses. R4, R6, and R9 reported incorporating HR audit into their operations, while some interviewees were unfamiliar with this activity (R1, R9, and R3) or noted its absence due to being in the early stages (R2, R11). For R4, R6, and R9, HR audit is assessing internal profiles (R4) and developing HR metrics including member engagement (R6, R13). These audits can be conducted internally (R6) or with external partners (R4, R6). While R12 and R13 have not yet conducted an HR audit, they acknowledge its significance; R12 considers it a critical next step to enhance performance management and member engagement, which supports active contributions to network activities (R13). For the essential of conducting an HR audit, R12 emphasised "*Given that our network is primarily people-driven, I want to emphasise the importance of human resources. Our people are our greatest asset.*"

Discussion

There are two typical structures were frequently found in the responses presented in the figures below. Each structure has unique characteristics and can influence the network's approach to communication, decision-making, and resource allocation.

*Figure 4: Functional Structure
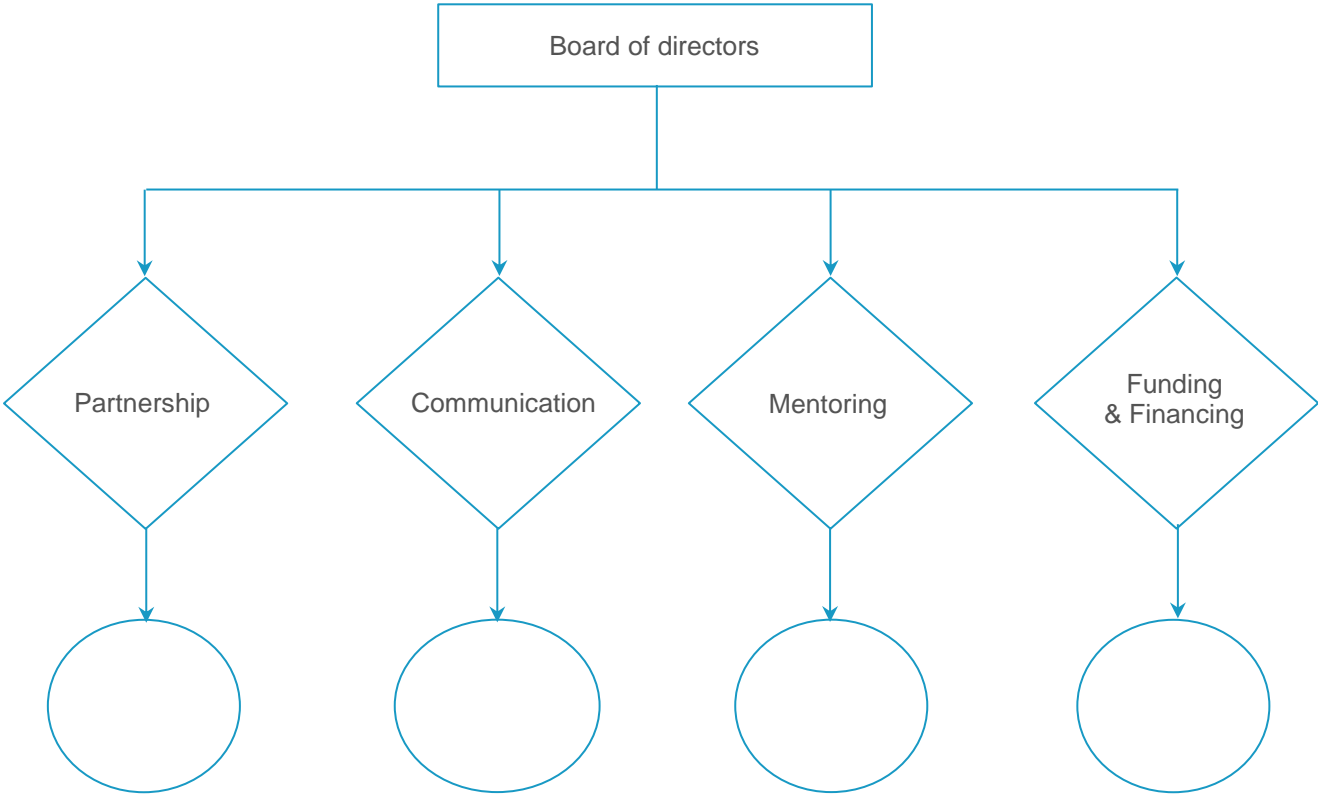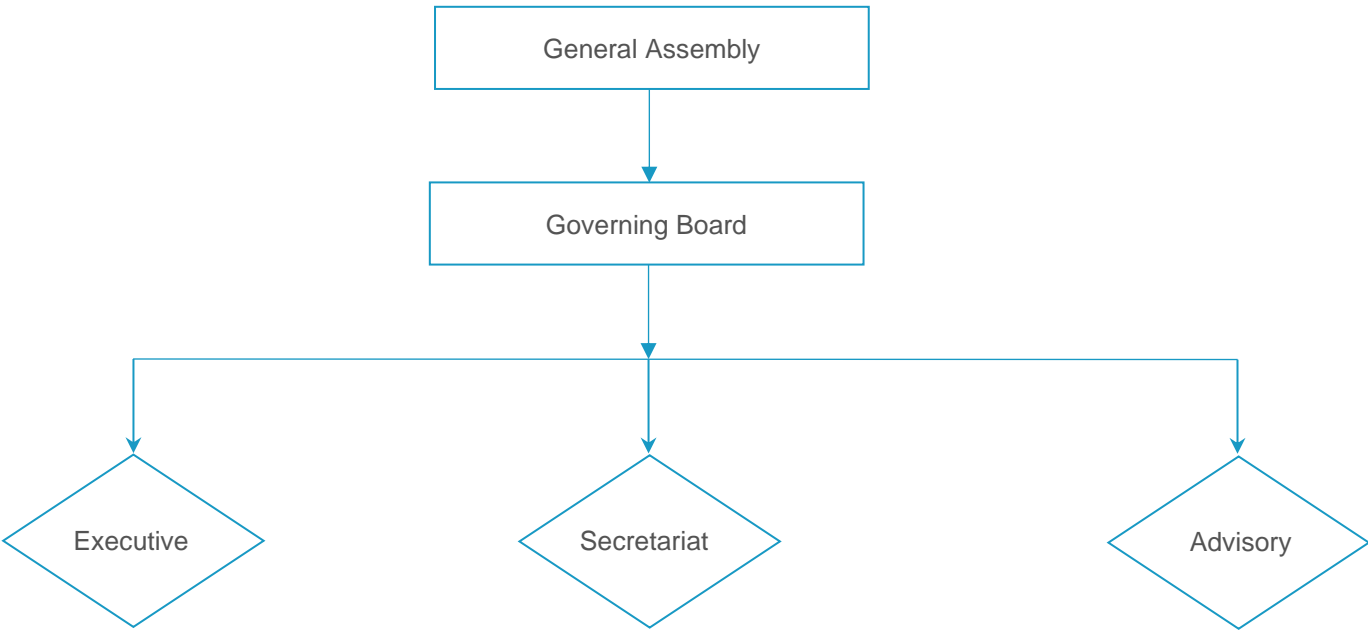(R8, R2, R7, R9, R5, R12, R13, R14)*

*Figure 5: Hierarchical Structure
(R3, R4, R6, R9, R10)*

A well-structured network plays a pivotal role in promoting gender equity, developing women leadership, and facilitating knowledge sharing in the energy sector. By improving fostering collaboration (R1, R8, R10, R13, R14), managing resources effectively (R1, R10, R11, R12), communication (R1, R11), and driving innovation (R10), these networks establish a solid foundation for promoting these core objectives. Clear communication channels and collaborative frameworks within a structured network empower members to share insights, experiences, and support, which are vital for tackling gender equity and leadership challenges. By improving collaboration and open dialogue, structured networks foster a culture of inclusion and mutual growth, enhancing their collective ability to address complex issues. Effective resource management is another cornerstone of structured networks, allowing them to allocate funding and time strategically. This approach ensures that initiatives promoting gender equity, leadership development, and knowledge sharing receive consistent support, driving sustainable progress. The flexibility within a structured network allows it to adapt to different stages of formation, geographical scopes, missions, visions, and goals, increasing efficiency in achieving its objectives. This adaptability ensures that networks can evolve as their priorities shift, making them more resilient and responsive to the needs of their members and the sector. Moreover, structured networks are better equipped to uphold accountability and transparency. By establishing clear processes for decision-making, reporting, and evaluating progress, these networks can maintain high standards of integrity and secure partnerships, funding, and external support.

On the other hand, an HR audit may not be essential for evaluating the effectiveness of a network. While regular audits can help networks remain adaptable to changing member needs by ensuring they adjust strategies and activities as sector priorities evolve, they are not always a necessity. Despite the benefits, HR audit are more commonly implemented within corporate networks of large companies due to the resources required to conduct them.

4.2.3. Sponsorship (Finance)

Findings

All interviewed network members agreed that financing plays a crucial role in the effectiveness of energy women networks. As R13 stated, *"Like any business, an organisation needs financial resources to sustain and grow."* R1 further underscored that *"the choice of the funding source can be crucial for the effectiveness of the women's network because it defines how independent or dependent you are in your actions."* Additionally, R11, R12, R13, and R14 highlighted the importance of having diversified financial resources to enhance resilience and adaptability.

The majority of interviewed networks indicated a preference for sponsorship or external funding as a primary financial strategy (R1, R3, R4, R6, R8, R9, R10, R11, R12, R13, R14, R15). Specifically, funding sources include corporate or company membership fees (R3, R5, R11) and funding from governments (R4, R15). Regarding corporate or company membership fees, R11 noted, *"we have companies that partner to support us with an annual membership."* From the promoter's perspective, R6 emphasised that sponsorship enables networks to support their institutional partners in implementing activities. Additionally, R9 pointed out that sponsorship is instrumental in attracting network members and helps them in activities implementing. However, R4 also noted that relying on bilateral funding can pose challenges due to shifts in development cooperation policies. Other limitations of the sponsorships cited by interviewees included dependency on political and economic situations (R4), sponsor influence over network decisions (R1), and constraints due to the network's legal status (R12, R13, R14).

Another funding option is paid membership fees, which some networks use to enhance financial independence (R5, R15). R11, who is considering a switch to a membership model, suggested that *"having a membership will make us not dependent on sponsors."*

A small number of networks do not have a formal financing model and rely on volunteer time and resources (R2, R7). However, these interviewees acknowledged that relying solely

on volunteer support could limit the network's overall impact. Some networks reported utilising a mix of financing options (R5, R15). None of the interviewed networks used the crowdfunding option.

From a promoter's perspective, R16 suggested that the network should continue to seek external funding sources to ensure sustainability. To support the networks in maintaining their sustainability, R16 internally proposed increasing visibility and attracting the attention of state secretaries, county directors, and department heads to strengthen the network's position within the organisation.

Discussion

Sustainable financial resources are essential for maintaining the operation of the network, which contributes to promoting gender equality, leadership development, and knowledge sharing. While Singh et al. (2006) highlighted sponsorships as an effective factor, our findings suggest diverse financing options. Given this diversity in financing methods, this factor should be reframed as "Finance."

Sponsorship/funding and membership fees are the most commonly used financing methods among the interviewed networks, while informal financing through volunteers is less common. Some networks choose a mixed financing approach to diversify their financial resources, providing greater flexibility to implement operational plans. Additionally, the choice of financing can affect accessibility; for example, R9 emphasised that sponsorship can make the network more accessible to women by supporting member fees.

4.2.4. Membership

Findings

R17 expressed the view that while the number of members in an energy network can significantly impact its effectiveness, other factors should also be considered to ensure meaningful results. Interviewees varied in their definitions of "membership": R1, R2, R7, and R9 included social media followers and reach, whereas R4, R6, R10, R12, R13, R14, and R15

counted formal members / local networks / partners.

R14 observed a significant membership increase attributed to webinar participation. R3 did not conduct a very offensive and active enlargement campaign, instead, they focused on engagement and interaction to naturally attract new members. Similarly, R2, R5, R9, and R12 mentioned the commitment and passion of the member as the indicator of an effective network. R5 highlighted challenges in growing membership post-pandemic due to financial constraints in paying membership fees. Specific membership targets were set only by R9 and R15.

R12 emphasised the importance of prioritising quality over quantity in membership. R16, as a promoter, acknowledged the value of a larger member base for communication purposes but also stressed a commitment to maintaining quality.

Discussion

While Singh et al. (2006) identified membership numbers and target achievement as key effectiveness factors for women's networks, our data suggests these are not the primary concerns for many interviewed energy women networks. Many interviewed energy women networks do not prioritise membership numbers; however, expanding membership can significantly support goals like gender equality, leadership development, and knowledge sharing. R17's view that effectiveness depends on factors beyond just membership size suggests that member count alone may not fully capture a network's impact. Therefore, the membership factor should also focus on the engagement and commitment of the network's members.

4.2.5. Women Positions

Findings

The crucial of leadership development was noted by R4 as *"leadership is cross-cutting. It's very important. In everything that we do, we feel when you're a women's network, then the leadership, the agency building, the*

empowerment needs to be central to what you're doing". R2, R6, and R7 highlighted the role of statistics in enhancing the effectiveness of the energy women networks for leadership development. Findings show that these networks have data on gender representation (R6) and expert information (R2, R7). A case study from R6 underscored the power of gender-specific data in advocating for gender equality and leadership promotion. For instance, before joining the network, members often had limited awareness of female representation and support within their organisations. Access to this data now clarifies the organisation's gender equality status, inspiring members to advance initiatives that promote women's participation and leadership.

To promote women to leadership roles in the energy sector, the networks foster a supportive environment (R4, R9, R10). This includes creating comfortable spaces (R4), encouraging women to support one another (R9), and establishing *"a platform for women to connect, share experiences, and gain exposure to industry leaders"* (R10). The networks also work to enhance the visibility of women by providing stages for them to share perspectives, express needs, and showcase success stories or best practices (R1, R11). Additionally, they organised various activities to promote leadership development such as training courses, showing role models, and sharing job opportunities (R1, R3, R4, R6, R7, R8, R9, R10, R15).

Discussion

The energy women networks play a crucial role in fostering gender equality and leadership development within the energy sector. Interviewees highlighted the diverse strategies employed by these networks to support their members in attaining leadership roles. These strategies include fostering a supportive environment, providing platforms for them to share perspectives, express needs, and showcase success stories or best practices, providing training courses, showing role models, and sharing job opportunities. Analysis of the findings indicates that the networks' leadership-promoting activities aim to increase the number of women in leadership positions. Therefore, statistics are an essential factor for evaluating

the success of these networks in achieving their goals.

Since this Study focuses on external energy women networks, the gender statistics factor used by Singh et al. (2006) for in-company networks should be adapted. In this context, it should specifically reflect data on the number of network members holding leadership positions within their respective organisations in the energy industry. Collecting this data is essential for gaining a clearer understanding of women and women's leadership representation. Developing a database to track these statistics could be an effective tool for identifying and addressing gender inequality and the under-representation of women leaders. This would allow the networks to develop feasible strategies to overcome these challenges.

4.2.6. Events and other activities

Findings

R1 emphasised that the roles of energy women networks vary depending on the focus and activities of each network, occurring across multiple levels.

These networks implement a wide range of activities to support and empower women. Common events include conferences, panel discussions, and networking events (all interviewed network members). In particular, R5, R8, R10, and R11 organised the events for younger generation including graduates and students. Training, mentoring programs, and site visit (R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R15) are also widely valued, along with communication initiatives (R1, R2, R3, R6, R7, R8, R11, R12, R13, R14, R15), success story sharing (R1, R4, R6, R8, R9, R12, R13, R14), and conducting research (R2, R3, R6, R8, R10). Some networks additionally provide job-seeking support (R5, R6, R8, R10), and podcasts (R6, R8, R11), though these activities are less common. While member surveys were not mentioned by the interviewed networks, both R16 and R17, who are the promoters, emphasised their importance for understanding member needs and gauging the network's impact.

Furthermore, some activities mentioned by interviewees were specifically related to the areas of gender equality, leadership development, and knowledge sharing as follows:

Gender equality: R5 and R12 demonstrate that each of their activities is aimed at evaluating gender equality. Other interviewees identified a range of activities, including organising events including conferences, panel discussions, webinars, workshops (R1, R9, R12), training (R9), communication (R1), sharing success stories (R1, R8), research/study (R3, R10).

Leadership development: Networks provide training courses (R1, R3, R4, R6, R7, R9, R10, R15) to prepare members for career growth, with network promoters also facilitating training on specific topics. R1, R7, R8, R9, and R10 mentioned role models as their strategy for encouraging women to become leaders in the energy sector. R5 and R9 shared job opportunities for women in the energy sector. Furthermore, R12, R13, and R14 said that they would design the activities for leadership promotion, which is a primary objective of their network.

Knowledge sharing: Energy women networks organise various activities to facilitate knowledge sharing. These include organising conferences, professional events (R7, R8, R9, R10, R15), training, mentoring and site visit (R3, R8, R9, R10), study/research (R2, R3, R8, R10), producing podcast (R11). A notable success story for mentoring shared by R3 is that a participant had a fruitful exchange with her mentor and with her peers that she wanted to give back and she decided to establish a woman in energy network, of which she became the first president and now has passed on the flame.

These activities aim to create a supportive community where women feel empowered and confident (R7, R14), equip women with tools for growth and improvement (R1, R10), amplify women's voices to highlight their needs (R1), inspire women to initiate new projects (R1), bring female perspectives into energy transition debates (R1), provide data on gender inequality and women's leadership in the energy sector (R6), and enable collaboration and mutual learning among women on projects (R14).

R16 emphasised that activities serve as indicators for measuring success in advancing women's roles and visibility in the energy industry, as well as in identifying women's needs. To foster the network's sustainability, R16 who represents the promoter organisation of the energy women networks should consider the scope that they can support. Similarly, R1 underscored the importance of fostering collaboration to attract more resources to support them.

Discussion

The implemented activities aligning with energy women networks vision, mission, and goals will support gender equality, leadership development, and knowledge sharing. These strategic activities directly advance the networks' objectives in promoting these areas. Furthermore, findings reveal a diverse range of activities, with some new forms emerging beyond those identified by Singh et al. (2006), such as communication, collaboration with other organisations, research/study, site visits, job-seeking support, and podcast production. This diversity broadens the scope of the networks' influence across a range of areas related to gender equality, leadership development, and knowledge sharing, thereby creating more extensive opportunities for women to benefit from energy women networks.

4.2.7. Reputation

Findings

The reputation of the energy women network was reported by interviewees through various channels. Invitations to conferences, exhibitions, and discussions with major and non-governmental organisations were seen as a form of recognition by R1, R2, R4, R6, R7, R8, R9, R10, and R11. Additionally, representation in articles and written communications demonstrated the network's public visibility (R1, R2, R3, R7, R8, R9, R11, R15). Social media presence (R2, R3, R7, R12, R13, R14), publications (R1, R3, R6, R10, R11), and awards received (R6, R8, R10) were also mentioned as factors contributing to network reputation.

R3 observed that an enhanced reputation could motivate a greater level of involvement in network activities. R9 and R10 highlighted that their reputation could enhance their ability to impact the gender gap in STEM fields and promote women's advancement.

Discussion

The reputation of the energy women networks plays a crucial role in advancing gender equality, leadership development, and knowledge sharing. The social media influence observed in this Study represents a new dimension of reputation recognition compared to earlier research (Singh et al., 2006). A strong reputation enables the network to collaborate with high-level partners and share its vision on gender equality, leadership, and knowledge within the energy industry. This helps the network effectively disseminate key messages and mobilise community action in these areas.

4.2.8. Diversity

Findings

R1, R2, R3, R5, R6, R8, and R11 mentioned diversity and inclusivity as factor that contribute to the effectiveness of the network. R1 stated that *"we need everyone, actually women, to make this transition happen."* R5 emphasised that gender equality is a shared responsibility, noting that *"the gender fight is not only the responsibility of us, but also of men."* R1 pointed out that individuals with diverse backgrounds and experiences can better address the unique challenges faced by different groups of women in the energy sector.

Several respondents encouraged including men in efforts to support women (R1, R3, R5, R6, R8, R11). This included sharing positive stories of men helping women (R8), including men in committees of power within networks (R6), and *"having men and women talking about topics rather than just women"* (R11). R11 also emphasised the need for inclusive leadership approaches. R2 and R11 further associated diversity with *"promoting a diverse group of people"* and *"being able to adapt to everyone to put them in the best situation in terms of knowledge sharing."*

Discussion

The effectiveness of an energy women network lies in its ability to mobilise meaningful support from diverse groups within society. This diversity enhances the network's capacity to promote gender equality, foster leadership development, and facilitate knowledge sharing. By leveraging diversity, the network gains access to valuable resources, enabling it to implement initiatives, drive innovative activities, and spread positive messages throughout the community. Additionally, the networks' goals to benefit diverse communities will help expand their impact and contribute to the acknowledgement of women's role in the energy sector.

4.2.9. Partnership

Findings

Several respondents (R1, R2, R4, R5, R8, R9, R10, R11, R12, R13) highlighted the importance of partnerships in the effectiveness of energy women networks. Identifying potential collaborators can lead to mutually beneficial relationships (R13). R5 and R9 both emphasised the importance of collective action, with R5 aiming to foster partnerships that promote policy and practice change and R9 intending to bring together all stakeholders for a major energy ecosystem event. R16, a promoter, emphasised the need for a clear plan outlining the network's support needs and collaboration strategy. R13 pointed out the importance of receiving external support from diverse entities, including state-owned enterprises, private businesses, and international NGOs. R4 stressed that connections with other organisations should translate into tangible human resource policies and practices supporting women's advancement.

R1 shared a good practice highlighting their strong connections with both the business sector and academia from the very beginning. These high-quality connections are developed through their members and partners. In practice, they work closely with the private sector while also inviting women from research, politics, and any field linked to the energy sector. In many

countries, they support entrepreneurs by financing initiatives and co-organising events.

Collaboration proposals, especially from higher-level professionals, served as another indicator of network effectiveness (R1, R2, R4, R5, R8, R9, R10, R11, R15). R4 remarked, "your work speaks for itself when others talk about what you're doing and want to work with you." R11 added that collaborations with reputable partners provided opportunities to discuss gender equality, diversity, and inclusion.

Discussion

Strategic partnerships and collaborative proposals significantly enhance the effectiveness of energy women networks in promoting gender equality, fostering leadership development, and facilitating knowledge sharing. A well-defined partnership strategy provides networks with insights into key stakeholders and helps develop targeted plans to engage them. While partnerships are vital, their true value lies in translating these connections into tangible results. Therefore, a clear strategy is essential to leverage partnerships effectively, maximising their support in achieving the goals of energy women networks. Moreover, collaborative proposals not only strengthen the network's reputation and credibility but also increase its connection to potential partners, attracting further support for its initiatives.

4.2.10. Policy

Findings

Politics and political institutions play a pivotal role in addressing gender inequality in the energy sector. As highlighted by R6, who emphasised that these institutions can either promote positive change or hinder progress, depending on whether the concerned ministry is supportive or not. Additionally, R1 emphasised that the political situation has led to delays and uncertainties in funding. This reliance on external factors can limit the network's activities and reduce its overall impact. To address these challenges, energy women networks have adopted strategies to engage in the policy-making process at the national levels. The role

of energy women networks in shaping energy policies in the future was emphasised by R14. The advocacy for gender-inclusive and gender-mainstream policies is included in the mission, vision, and goals of R4 and R15. The network of R6 and R10 have dedicated policy pillars focused on policy development and retention. The energy women networks also implement various related activities, including lobbying for gender-responsive policies (R15), advising governments and different organisations (R4), and participating in high-level discussions and speaking engagements (R8). The effectiveness of these networks in creating professional environments that leverage women's strengths and contribute to national energy transitions has been recognised by R14.

Furthermore, these networks develop and implement solutions at the organisational level to promote inclusive and supportive workplace policies and practices. R6 has five core pillars, including retention, outlined in a document known as the List of Activities (LOA). They also developed a framework to support members facing harassment and conducted gender studies that led to significant workplace improvements. Following a similar approach, R10, a partner of R6, offers daycare services, breastfeeding facilities, annual health check-ups, health allowances, and organises awareness workshops, demonstrating a commitment to fostering a supportive environment for women. R4 and R5 connected with other organisations to drive the change in their partner's human resource policies and practices to support women's advancement. R4 set up women's networks within organisations and discussed with HR to change the policies, practices, and procedures that focus on recruitment, advancement, and retention policies. From the promoter position, R16 offers gender-related policy recommendations that partner organisations can adopt, further driving positive change.

Discussion

The political landscape significantly influences the creation of policies and laws that impact the development and implementation of initiatives by energy women networks. These networks can be more effective in promoting gender equality,

leadership development, and knowledge sharing when supported by a favourable policy framework.

Energy women networks actively engage in policy advocacy, contributing to the development of future gender-inclusive policies at the national level. Additionally, their efforts extend to transforming policies within organisations, and fostering more equitable working environments. The findings highlight the significant impact of these networks in driving gender-responsive policies and improving workplace conditions.

Chapter 5: Conclusion and Recommendations

Chapter 5: Conclusion and Recommendation
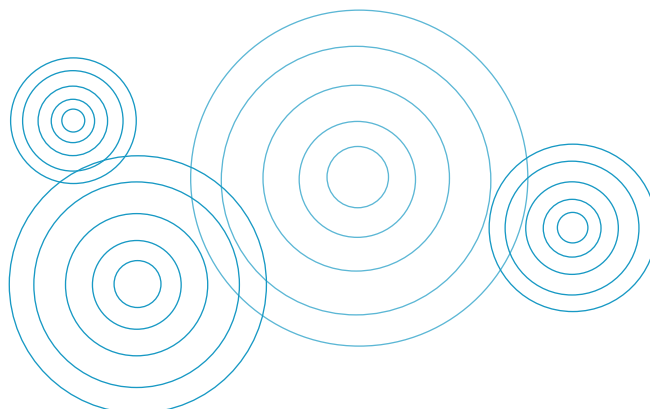
5.1. Conclusion

RQ1: How do "social motivations" and "career motivations" influence women's participation in energy women networks?

Social and career motivations both play essential roles in encouraging women to join and engage in energy women networks. These motivations shape the mission, vision, and goals of such networks, supporting women's empowerment and advancing the energy transition through a more gender-inclusive workforce.

Social motivations include meeting with other women, commitment to gender equality, sharing experiences, supporting other women, increasing visibility, building self-confidence, and fostering collective agency. Among these, commitment to gender equality is one of the most common reasons women join energy women networks.

According to the frequency of mentions, career motivations include learning and development, sharing knowledge, mentorship and access to role models, networking, leadership development, improving career prospects, gaining support, and policy development. These motivations not only provide women with practical tools and resources for professional advancement but also make networks valuable for both personal and professional growth.

Among these motivations, gender equality and sharing knowledge emerge as the top priorities, highlighting the commitment to addressing barriers for women in the energy sector and fostering collective learning. Furthermore, the development of leadership skills is identified as a significant motivator, reflecting women's aspiration to advance into leadership positions.

RQ2: What is the efficacy of women's networks in contributing to gender equality, women's leadership development, and knowledge sharing within the energy sector?

The efficacy of energy women networks has been evidenced, highlighting their critical role in promoting gender equality, fostering leadership development, and facilitating knowledge sharing. The mission, vision, and goals of these networks are closely aligned with key women's motivations of gender equality, leadership development, and knowledge sharing. This alignment demonstrates that the networks have identified the key drivers contributing to their success, ensuring they are in tune with the aspirations and needs of their members. Furthermore, these networks are well-organised, with clear structures, well-defined membership systems, sustainable financial resources, strong reputations, diversity, and strategic partnerships. These elements collectively enable the networks to advance women into leadership positions and effectively execute their activities, thereby promoting gender equality, leadership development, and knowledge sharing.

Most of the interviewed energy women networks are well-structured, mostly adopting two typical organisational models: functional and hierarchical structure. Some networks also conduct HR audit, a comprehensive assessment of internal human resources profiles and the development of HR metrics, to ensure the

effectiveness of their structures in human resource governance. These efforts enhance communication, foster collaboration, optimise resource management, and drive innovation. These networks maintain sustainable financial resources through sponsorships and memberships. Additionally, they leverage volunteers as an informal financing option, which ensures their independence. The use of diverse financing options supports their long-term success and operational resilience. In parallel, energy women networks focus on both expanding membership numbers and nurturing engaged and committed members. By prioritising the quality of membership, these networks secure skilled human resources for their operations. Over time, they have built strong reputations and gained recognition from society, partners, and other stakeholders. Furthermore, these networks actively promote diversity, including involving men, to create more meaningful impacts and amplify their reach. Collectively, these factors make energy women networks highly effective platforms for advancing gender equality, fostering leadership development, and facilitating knowledge sharing.

With the effective operation of energy women networks and the fulfilment of their core motivations, these networks play a crucial role in advancing gender equality, leadership development, and knowledge sharing within the energy sector. This impact is supported by statistical insights into women's positions in the industry and the activities carried out by these networks:

Gender equality

Women's statistics provide a contextual foundation for understanding the issues of gender inequality and the under-representation of women in leadership positions within the energy sector. These insights help energy women networks design and implement meaningful initiatives that address these challenges. To combat gender disparities, the networks organise a variety of activities, such as conferences, panel discussions, networking events, training and mentoring programs, site visits, communication campaigns, the sharing of success stories, research studies, and the

dissemination of best practices. These initiatives aim not only to raise awareness but also to create tangible opportunities for women to advance and thrive in the energy industry.

Leadership development

Women's statistics also shed light on the success of energy women networks in promoting leadership development and advancing women into leadership roles. Leadership development is facilitated through a range of activities, including events, training courses, mentoring programs, and site visits, sharing success stories, and job-seeking support. These activities contribute to empowering women to take on leadership positions in the energy sector.

Knowledge sharing

Data on women experts in the energy field also plays a significant role in promoting knowledge sharing within the sector. Energy women networks facilitate knowledge sharing through various means, such as organising events, training programs, mentoring opportunities, site visits, research studies, and podcasts. These platforms enable the exchange of ideas, experiences, and best practices, empowering women to contribute to the energy sector.

By maintaining key effectiveness factors, women's networks can fulfil their motivations, which in turn enables them to meet their objectives in advancing gender equality, leadership development, and knowledge sharing. This alignment directly supports the networks' mission and vision. However, the findings also highlight that the effectiveness of these networks is influenced by the broader political landscape.

The successful implementation of activities and the sustainability of funding are significantly influenced by policy factors. It has a direct impact on the efficacy of energy women's networks in addressing gender inequality, underrepresentation in leadership, and knowledge disparities. As a result, these networks actively advocate for gender-responsive policies at both the national and organisational levels, aiming to create a

supportive environment that empowers them to achieve their goals.

In summary, the final model for assessing the roles of energy women networks in promoting gender equality, leadership development, and knowledge sharing is presented in the figure below:

Figure 6: Final model to assess the roles of energy women network in promoting gender equality, leadership development, and knowledge sharing
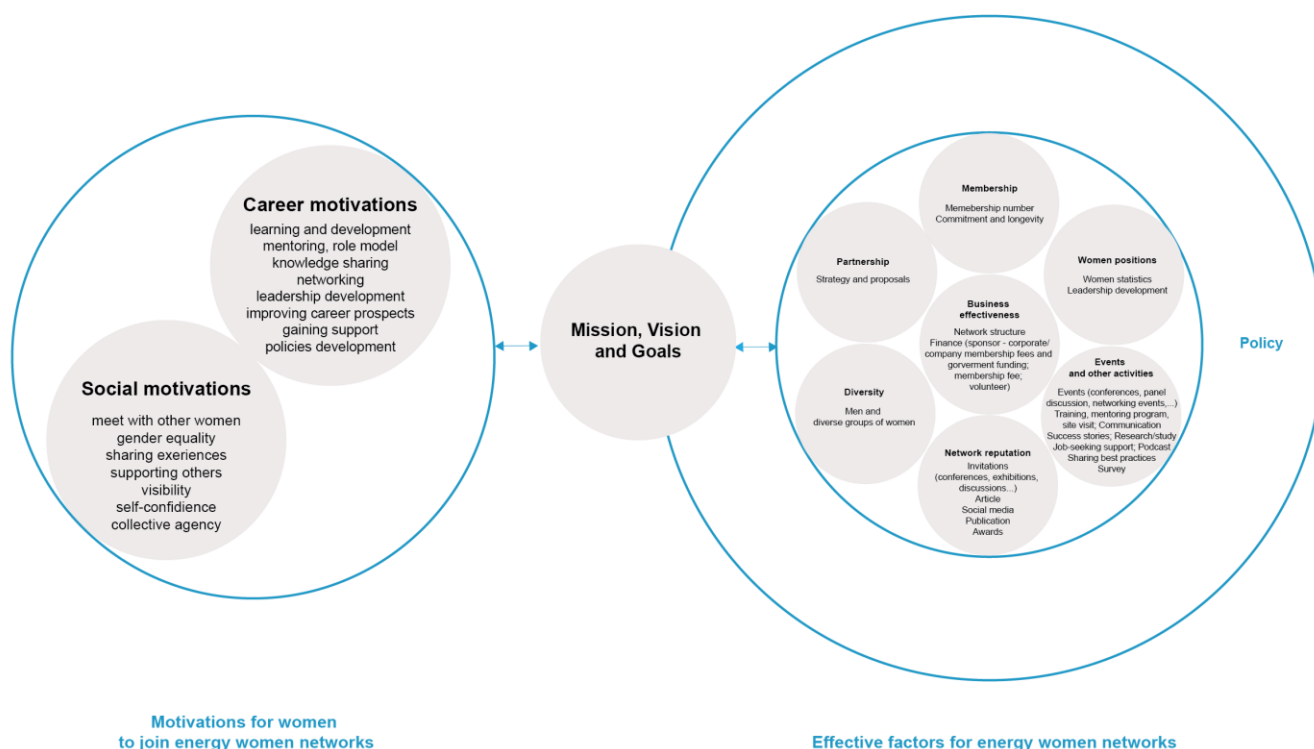
5.2. Recommendations for activities outreach and impacts improvement

Recommendations

These energy women networks play a key role in promoting gender equality, fostering women leaders, and enabling knowledge sharing within the energy industry. Therefore, sustaining the effectiveness of these networks is essential to amplifying their meaningful impact in these areas. To ensure the effective operations, recommendations are made focus on improving eight effectiveness factors: mission, vision and goals, business effectiveness includes structure and finance, membership, women positions, events and other activities, network reputation, diversity, and partnership.

Energy women networks should present a clear and compelling vision, mission, and set of goals that align with broader national and international objectives on gender equality and workforce diversity. Additionally, it is essential for these networks to maintain a flexible and adaptable structure, capable of accommodating groups at different stages of development, from new to well-established. To build trust with sponsors and members, the energy women network must diversify its funding sources and ensure transparency and accountability in financial management. Rather than focusing solely on membership size, it is crucial to prioritise the recruitment and retention of engaged and committed members. The energy women network should also establish a centralised, easily accessible database of women in the

energy sector, which not only facilitates efficient data use for network initiatives but also provides valuable statistics to advocate for greater gender equality. Events organised by the energy women network should be designed to meet the diverse needs and interests of members, offering a variety of formats and topics while fostering an inclusive culture that values diverse perspectives. The energy women network should actively enhance its reputation through various channels such as communication, press, conferences, awards, and collaborations to improve visibility, attract partners, and amplify its impact on gender equality in the energy sector. Finally, the energy women network should create a strategic partnership plan that clearly outlines objectives, identifies potential collaborators, anticipates partnership outcomes, and defines strategies for sustaining these relationships.

Engaging with policymakers and political institutions is also crucial to promote policies that advance gender equality in the energy sector. Policymakers have a pivotal role to play in developing and implementing initiatives that support women in the energy sector. This includes providing funding for scholarships in STEM fields, grants for women-led energy businesses, and conducting research on gender and energy. They should also collect and analyse data on women's representation and experiences in the energy sector to track progress and identify areas for improvement in supporting energy women networks.

Industry stakeholders and promoter organisations can provide support to women's networks through financial sponsorships, partnerships and mentorship opportunities. They can also collect and publicly report data on gender representation at all organisational levels, set targets for increasing women's leadership roles and hold leaders accountable. The formation of in-company women's networks in larger companies can facilitate career advancement for women.

Potential Audience and Applications

This Study offers a comprehensive understanding of the role of women's networks in promoting gender equality, women leadership development and knowledge sharing within the energy industry globally that can be applied to address critical challenges faced by the energy women networks, industry stakeholders, policymakers and government agencies, international organisations and development agencies, donors and funding agencies.

Energy Women Networks

This Study provides a framework for networks in their formative stages, based on insights into women's motivations, which can be used to create strategic resource allocation plans and partnerships that support the network's mission, vision, and goals. For established networks, the Study can offer ideas for formulating key performance indicators for the measurement of effectiveness, contributions, and impact, as well as for the conduct of a gap analysis aimed at the identification of areas for improvement. The author suggests using this Study as a campaign for programmes that support the promotion of national, regional, and international networks. This Study can also serve as an insightful resource for initiatives that assist the activities of these networks and a policy advocacy resource for gender and energy issues.

Policymakers and and Government Agencies

Policymakers can use the insights in this Study as the foundation of the necessity to design and implement gender-responsive policies that promote equal opportunities in the energy sector to achieve the energy transition. Additionally, both policymakers and government agencies can leverage this Study to bolster gender equality initiatives within the energy sector.

Industry Stakeholders (Energy Companies, Association, …)

The findings can provide industry stakeholders with valuable insights to develop policies and design the activities for the networks within their organisations to foster environments that address gender disparities and create pathways for women to thrive in technical and leadership roles. By leveraging the Study, companies can design programmes that promote gender equity and improve recruitment, retention, and promotion practices. Furthermore, energy

companies and industry associations can develop strategies for collaborating with women's networks to enhance these efforts.

International Organisations and Development Agencies

This Study provides a framework for supporting organisations to develop an evaluation system to assess effectiveness and offers capacity-building support focused on leadership development, strategic planning, and financial management for the networks they currently support, while also conducting due diligence on potential collaborative initiatives.

Donors and Funding Agencies

Organisations that fund projects and donors focused on gender equality, leadership, and women's empowerment can use the Study to prioritise funding for initiatives that strengthen women's networks in the energy sector.

Communication Campaigns

This report is practical for implementing a campaign to promote the role of the network and demonstrate its effectiveness. To achieve this, targeted communication materials should be developed to highlight the Study's findings and the positive impact that women's networks in the energy sector bring to all stakeholders. Additionally, the results of this report should be disseminated to supporting organisations so they can see that their support will ensure long-term and sustainable development.

Chapter 6: Limitations

Chapter 6: Limitations
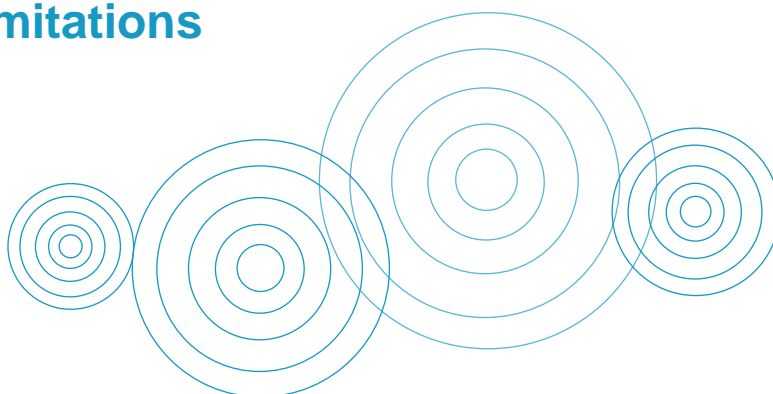
Limitations of this Study

The Study's findings may be limited by its relatively small sample size and purposive sampling technique. Focusing on perspectives from energy women networks, may not fully capture views from other stakeholders, such as government agencies, non-governmental organisations (NGOs), institutions, and different interest groups. With only 17 interviews conducted across 11 energy women networks and 2 promoter organisations, the generalisability of the results may be constrained. Additionally, the sample is disproportionately represented by board members, which offer valuable insights into organisational structures and funding mechanisms, potentially overlooking women's experiences in lower management or non-professional roles. The geographical focus on specific networks may not reflect the experiences of those in other regions, potentially leading to a geographically biased perspective. Therefore, future studies should adopt a more inclusive approach, incorporating a broader spectrum of perspectives, and positions across organisations, as well as from diverse geographical regions to provide a more comprehensive understanding of the topic.

The reliance on self-reported data can introduce biases and limitations in data accuracy. Furthermore, conducting interviews in English may have introduced language barriers and cultural nuances that were not fully captured, potentially affecting the accuracy and richness of the data collected. Additionally, researchers should be mindful of cultural differences and adapt interview protocols to local contexts.

Observing the positive impact of policy interventions and strategic partnerships on strengthening women's networks in the energy sector, future research could investigate how the policy landscape influences the establishment and sustainability of these networks. Specifically, further studies should explore the role of strategic partnerships between government, industry, and women's networks in advancing gender equality, identifying successful models that can inform policy initiatives aimed at fostering cooperation and shared goals across stakeholders.

Future research should also prioritize the role of gender statistics in shaping policy decisions and supporting women's networks. Investigating how gender data is currently collected, analyzed, and utilized across the energy sector can help create a more informed, data-driven approach to advancing gender equality in the energy industry

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