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The role identities of women middle management academic leaders in STEM higher education

Saba Qadhi[a], Xiangyun Du [b], Youmen Chaaban [a], Hessa Al-Thani[a] and Alan Floyd[c]

[a]Qatar University, Doha, Qatar; [b]Aalborg University, Aalborg, Denmark; [c]University of Reading, Reading, UK

ABSTRACT

Despite the increasing number of women in STEM professions and higher education, they are underrepresented in middle management leadership roles. In these roles, they face challenges balancing multiple demands, especially in male-dominated cultures. This research used a life history approach to investigate the role identities of three female middle management leaders in a Qatari university. The Dynamic Systems Model of Role Identity guided the semi-structured interviews where participants shared their past, present, and future stories. The findings revealed the intricate manner in which the participants formed their leadership identities, emphasizing values like motherly care, trust, and respect. Through their goal-oriented self-perception, they fostered collegial support and motivated peers. While formal leadership training was lacking, they leaned on past experiences and family support to handle leadership tasks and life responsibilities. The study recommends better support for women academic leaders.

1. Introduction

Internationally, the field of Science, Technology, Engineering, and Mathematics (STEM) has been historically dominated by men over women in both the profession and higher education (Layne 2010; Sagebiel 2018). Over recent decades, the gender imbalance has been under negotiation and change with a growing number of women entering the field and tremendous efforts exerted in the recruitment and retention of women in higher education and the workforce. These numbers vary by country due to multiple factors, such as policies, governmental strategies and institutional efforts in specific contexts (Lopez and Duran 2021; Towni et al. 2021). Globally, a disparity has also been observed regarding gender parity. While certain regions such as North America and Northern Europe, in particular, have the highest reported percentage of closing the societal gender gap women's representation in STEM remains generally challenging (Danielsson 2012; Lopez and Duran 2021; Marinelli, Male, and Lord 2021; Sagebiel 2018; Silfver et al. 2022). In contrast, some regions such as Southeastern Asia and the Middle East, have the least reported improvement in closing overall gender gap, reported rapid growth in recruiting women in STEM (Towni et al. 2021). Yet, the literature across countries has reported gender parity in leadership with worrying facts of women's persistent underrepresentation in both these regions (Azizi et al. 2022; Towni et al. 2021). A general low participation of women in academic leadership remains a challenge in the process of establishing gender inclusiveness in STEM higher education (Silfver et al. 2022;

Towni et al. 2021). In particular, proportionally very few women are reaching the rank of senior leadership, such as professorship, and even fewer women occupy positions like institutional leaders (Azizi et al. 2022; Layne 2010; Towni et al. 2021). To support women's career growth to senior academic leadership, it is essential to understand how they develop a journey of academic leadership from middle management positions (Fritz and Van Knippenberg 2018; Marinelli, Male, and Lord 2021). From a career development perspective, women academics often drop out at this stage of their career development, struggling between multi-faceted challenges in middle leadership positions and their research careers (Towni et al. 2021).

To address such cross-cultural concerns of gender gap in leadership roles (Ottsen 2019), this study argues that there is an urgent need to explore how women academic middle leaders experience and negotiate their leadership roles in their situated contexts. The advancement of women into leadership roles in STEM has the potential to make the field a more attractive career path for young women (Layne 2010). To advance the understanding of the persistent gender gap in leadership in general and in particular in the STEM field, this study explored the experiences of STEM women middle academic leaders in their career path. The study took place in Qatar, a developing country in the Middle East. The country became independent since 1971 and evolved from the poorest state in the Gulf Region to a wealthy and strategically vigorous country over the past two decades. Borrowing many Westernised development strategies on diverse societal development, the country is considered a captivating example to explore how modernity develops in patriarchy (Lari, Al-Ansari, and El-Maghraby 2022; Salem and Yount 2019). Over the decades, considered as a conservative society with gender segregation in multiple aspects of public spheres including education, Qatar has made noteworthy advances towards gender equality and women's empowerment as an impact from socio-economic transformation (Lari, Al-Ansari, and El-Maghraby 2022; Salem and Yount 2019). The past decades observed a rapid increase of women's access to resources such as educational opportunities and economic independence. For instance, women's participation rate in labour force increased from 3.8% in 2000 to 20% in 2022, being the highest in the Gulf Region. Such gradual increase can be seen as potential for their career path towards leadership roles (Sharif 2019). Nevertheless, recent studies have also reported how conservative traditions embedded in a patriarchal structure and male dominance in politic authority remain obstacles to women's further advancement in decision making and senior leadership roles in the society (Salem and Yount 2019).

Within education, national reforms over the past two decades have also significantly increased opportunities for women to be educated and have led to women outnumbering men in all schooling systems (Salem and Yount 2019). Further, concepts such as decentralisation and democracy were also introduced in Qatari educational settings involving stakeholders, although challenges were encountered due to conservative traditions (Romanowski and Du 2020). Following the national strategies of addressing Sustainable Development Goals (SDGs), there has been ongoing societal change toward establishing a growing number of educational institutions, as a consequence, more women were promoted to leadership positions. Overall, these initiatives observed women's representation in educational leadership positions, constituting 67% of elementary schools (K6), 46% of preparatory schools (K7-9), and 44% of high schools (K10-12) according to the national statistics in 2014 (Vogel and Alhudithi 2021). While recent research attention has been paid to overall women's leadership roles in industry and the early stages of educational institutions (K12), this study argues that it is of interest to explore women leadership roles in higher educational settings, which remains an area with little knowledge. Even less is known how women in STEM fields, which are core areas in the national strategic plans, contribute to societal development.

Supported by a national grant aiming to encourage more women to aspire to academic leadership positions, this study explored previously unheard voices by drawing on data from the life histories of three women who served as department heads at least once in their career path. Conceptualising leadership and gender as complex matters, this study was embedded in the Dynamic Systems Model of Role Identity (DSMRI) framework by Kaplan and Garner (2017). This

study was driven by the following research question – how do women STEM middle management leaders perceive their leadership role identities? While quantitative data have supported these findings, there have been fewer attempts to gain insights into the stories of female academic leaders (Towni et al. 2021). Therefore, it is necessary to listen to their narratives and understand how they negotiate with multiple interrelated factors in their organisational contexts (Kulik and Olekalns 2012).

2. Literature and theoretical framework

2.1. A complexity theory lens on gender, identity, and leadership

Complexity theory, addressing change, adaptation, development and evolution that involve multiple components interacting non-linearly in a system, has been recently adopted in educational settings to understand difference and examine phenomena through an organic and holistic approach instead of looking at the world in a cause-and-effect and linear way (Davis and Sumara 2014; Morrison 2008). Concepts such as creativity, collective knowledge, and individuals' abilities to handle uncertainty and emergent changes, rather than emphasising standardised individual performance, are underlined in such a lens (Davis and Sumara 2014; Garner and Kaplan 2019; Kaplan and Garner 2018).

Research in gender and STEM has shifted from focusing on women's underrepresentation to understanding their experiences and roles, namely their gendered identities (Lopez and Duran 2021; Male et al. 2018; Silfver et al. 2022). Over the past decades, several researchers have reported how women negotiate their gender identity and their engineering and science identities in the journey of becoming professionals; that is in relation to the dominant discourse of the discipline, which is often related to the cultural ideology of masculinity (Danielsson 2012; Du 2006; Ong, Smith, and Ko 2017; Tonso 2006). While women construct discourses available to them in their specific institutional and societal contexts, they generate meanings for themselves (Butler 1990). In addition to gendered discourse, the gendered identity is also constructed by 'doing', which is reflected through reified performances in practice instead of by biological and societal causes, as Butler (1990) highlighted. Not alone, the concept of 'doing gender is often considered as mutually constitutive with other social categories, such as ethnicity and social class, among others (Berge, Silfver, and Danielsson 2019; Silfver et al. 2022). In line with Butler's theoretical ground on 'doing gender' in identity construction, complexity theory is relevant by viewing individuals as dynamic systems exercising agency through making choices rather than merely following a prescribed and programmed sequence (Davis and Sumara 2014). In this way, individuals, women or men, can be considered complex dynamic systems who exercise choice and agency concerning their actions in discursive practices (O'Meara 2015), while negotiating their gender and doing science/engineering (Danielsson 2012).

Similarly, academic leadership is also a complex matter demanding new values, knowledge and competencies to respond to increased institutional complexity (Clarke 2013) and to negotiate institutional conditions regarding higher workloads and lower research productivity (Freeman, Karkouti, and Ward 2020; O'Meara 2015; Thornton 2020). Research has also reported how women academic leaders experienced limited resources regarding research funding and support from their surroundings and families (Azizi et al. 2022; Fritz and Van Knippenberg 2018; Layne 2010; Stewart and LaVaque-Manty 2008). By acting in an agentic manner and taking a communal style in middle academic leadership, they were considered 'violating the feminine-niceness prescription' (Rudman and Glick 1999). Women leaders in fields that men conventionally dominate, such as STEM, have to demonstrate more strength to negotiate their professional identity (Fritz and Van Knippenberg 2018; Male et al. 2018) and their autonomy in nested systems, which involves diverse aspects of cognition, such as efficacy, affect, and motivation, as well as and their relationships with students, colleagues and leaders in situated contexts (Morrison 2008).

2.2. Role identities of women academic leaders in STEM

While identity formation and negotiation are seen as the core of gendered discourse and practice (Ong, Smith, and Ko 2017; Silfver et al. 2022; Tonso 2006), equally important is the negotiation of university academic identity (Van Lankveld et al. 2017) and gendered leadership roles (Layne 2010). In a complex and dynamic learning process, academic leaders negotiate and renegotiate their identities regarding who they are, what they believe, and what they want to achieve in their given institutional contexts (Kaplan and Garner 2018; Layne 2010). Accordingly, how they reshape their beliefs about their identity roles is essential to agency and strength (O'Meara 2015). In contrast, lacking a sense of renegotiated identity in relation to what it means to be women academic leaders would limit their motivation to change their practices (Kaplan and Garner 2017).

From a complexity theory perspective, the academic leader's role identity can be conceptualised as a complex dynamic system embracing a network of interrelated components that are dynamically emerging within situated surroundings. In particular, it embraces lived practices that are influenced by and influence their self-related beliefs, perceptions, emotions and personal stories (Kaplan and Garner 2017), which in combination constitute their perceptions of being a women academic leader. Following such, this study was theoretically inspired by the Dynamic Systems Model of Role Identity (DSMRI) proposed by Kaplan and Garner (2018) and Garner and Kaplan (2019), emphasising the centrality of the role identity of individuals on both the personal level of the professional role (e.g. self-perceptions, beliefs) and the social-cultural context in which they work (e.g. socialisation and negotiation through participation in communities of practice) (Kaplan and Garner 2017).

In particular, the DSMRI model has four interactive multi-element dimensions, which can be related to the given context of the study: (1) Self-perceptions and self-definitions – academic leaders' perceptions and knowledge of their self-defined characteristics and group memberships and how these are relevant to their gender role and leadership role; (2) Epistemological beliefs – knowledge that the individual holds as true regarding what it means to be a leader in a situated context; (3) Purpose and goal – committed purposes for their roles (of being a leader and a woman) and goals (specific and broad); (4) Perceived action possibilities – perceptions, intentions and emotions that concern what individuals can and cannot do to achieve their goals in being academic leaders in light of their epistemological beliefs and self-perceptions. In addition, culture and social context are critical dimensions for defining the ways the construction and negotiation of their role identities may happen or not, impacted by how they perceive the role of their disciplinary domains, personal dispositions, interaction modes with others (e.g. students, faculty members, peer leaders, and senior leaders), institutional facilities and policies, and cultural norms and expectations at a more enormous societal scope (Chaaban et al., 2023).

While the DSMRI framework has been well-used in examining teacher learning, it is considered relevant and original to the context of this study to explore academic leadership from a gender lens. From such lens, the study explored the way women STEM middle management leaders perceive their leadership role identities regarding beliefs, goals, perceived roles and action possibilities, as well as how they have been prepared for such roles and the challenges they encounter.

3. Methods

3.1. Research design

The social-cultural role of an academic leader is deeply embedded in cultural understandings and enacted in specific social contexts by individuals. From a complex dynamic system perspective, the role identity in a complex system of gendered leadership cannot be predicted but only analyzed (Garner and Kaplan 2019). Therefore, in this study, we adopted a qualitative approach to research design to explore women's narratives about becoming and doing gender (Butler 1990) in their academic leadership roles in STEM. Specifically, narrative inquiry was used for data collection due to its

advantage of illumining a person's lived experiences (Atkinson and Delamont 2006; Chase 2005; Floyd 2012). The method has been increasingly adopted in research leadership career trajectories in higher education to provide profound understanding of life situations highlighting the academic leaders' perceived experience, not only emphasising their biographical influences of human subjectivity and perceptions, but also highlighting connections between individual leaders' intrapersonal experiences, emotions and how they perceive their interactions with others within their situated contexts in higher educational institutions (Damiani, Rolling, and Wieczorek 2017; Floyd 2012; Wei and Xing 2022). Particularly, narrative inquiry provides opportunities to hear stories of under-represented groups, such as women in STEM (Tucker and Fushell 2014). With the reasons mentioned above, a narrative approach is particularly useful to explore how women academic leaders in STEM perceive their career paths and construct and negotiate their role identities.

3.2. Participants

Upon receiving IRB approval, contact details of department heads were provided by the university administration office, including approximately 50 names that had served as department heads in the past five years (i.e. some of them were not currently in service). A stratified purposeful sampling strategy (Atkinson and Delamont 2006; Chase 2005; Floyd 2012; Floyd et al. 2023) was adopted by inviting all the 12 women who had served as department heads in STEM fields, including chemical engineering, computer engineering and science, mathematics, pharmacy, and health science and technology. Within the research timeline, three among the 12 female academic department heads in STEM volunteered to participate in this life history study. All were around 50 years old, were full professors, and had over 20 years of teaching experience.

With their permission, semi-structured interviews were conducted with audio recording, each lasting over 60 min. One interview was conducted in English, and the other two were conducted in Arabic, with the transcription translated into English afterward. During the interviews, the conversations between the interviewers (two of the co-authors) and the participants were guided by the interview questions, but with flexibility and no fixed order (Floyd 2012). In the process, the interviewers followed the suggested techniques by Kvale (2007) and asked one question at a time in an open-ended mode while trying not to interrupt the participant. Sufficient space was offered to the participants to elaborate on their perceptions, feelings, experiences and emotions.

A critical discourse analysis (CDA) technique (Wodak and Meyer 2009) was adopted in interpreting these female leaders' discursive practices of doing gender in academic leadership. Viewed as knowledge creation through language and approach in particular institutional settings, CDA allows for embracing integrated factors that influence identity negotiation, including time, place, social roles and relationships, and the role of knowledge in discourse production. It has been well-adopted in gender studies and university management research to explore forms of subjectivity and power relations, capturing participants' conscious and unconscious minds and emotions (Mullet 2018). With the awareness that CDA is primarily about the researchers' positioning (Mullet 2018), the dialectic characteristic means that researchers' familiarity with the context of the participants can be seen as a resource for understanding and interpreting participants' manifestation of discursive practice of their lived experiences and an opportunity to emancipate themselves from domination through reflection and self-awareness (Wodak and Meyer 2009).

3.3. Data analysis

Inspired by previous work on narrative inquiry (Atkinson and Delamont 2006; Chase 2005; Floyd 2012), a multi-analysis approach was used in this study. An integrated and cumulative process was involved in the data collection and analysis process (Kvale 2007). First, open coding was conducted to provide a holistic narrative profile of each participant (Floyd 2012; Tucker and Fushell 2014; Wei and Xing 2022). Notes were made with significant events or instances for each participant,

marking initial impressions of the individuals' stories on the four aspects of role identity following the DSMRI model (Garner and Kaplan 2019). While emerging themes were marked using different colours, the storylines were reported following a flow of the participants' journey to academic leadership, including their prior educational and leadership experience, their perceived role identify including the four dimensions of goals, beliefs, perceived roles and action possibilities, followed by their perceived challenges in gendered roles, and their future prospects. Second, a cross-participant comparison was made through the axial coding process and another round of reading. Finally, the initial codes from individual profiles were used to compare meanings and patterns, and to categorise sub-themes according to emerging meanings in situated contexts (Kvale 2007).

Following Guba and Lincoln (2005), efforts were made to improve the trustworthiness of the study by sharing initial interpretation of the data with the participants and through iterative questions during the informal conversations. The research team members individually and collaboratively conducted several rounds of reading transcripts and interpretating meanings. With these efforts, agreements were reached among researchers and with each participant in a collaborative mode regarding how the stories were to be presented.

4. Findings

In this section, we report the unique life history of each participant through three stories. Integrating the deductive strategy derived from the DSMRI model and the inductive analysis of the stories, the life history outcome provided findings of the study, including the four dimensions of the DSMRI model, as well as their leadership growth and the challenges they encountered, adding up to six sub-themes. In particular, the section is presented following the storylines of (1) journey to academic leadership, (2) self-perceived academic leadership role identity, (3) challenges, (4) perceptions of gender, and (5) future prospect. Considering privacy, sensitive personal information, such as their detailed disciplinary backgrounds, was eliminated from the stories presented below.

4.1. Sara's story

4.1.1. Journey to academic leadership

Growing up in a family with several societal leaders (grandfather as a poet and leader, father as a diplomat), Sara anticipated herself contributing to society beginning in childhood. Having experienced living in several countries, Sara started to think about the critical role of education in society at a young age. Driven by such goals, she performed well in her schooling, with a particular interest in math and science. Being open-minded, her father encouraged her to read all kinds of books and try out new things, as he did to other boys in the family. For example, together with her brothers, she learned about computers when they were new to Qatari society.

With her extraordinary performance in math, she chose to study science and engineering, which was an area with few women in the 1990s, not to mention the overall under-representation of women in higher education at that time. Nevertheless, she received support from her open-minded family. Upon college graduation, she was employed to give lectures to students without a proper title, office, or appropriate salary, due to the regulations that men should prioritise all academic positions at that time. She described, 'all those positions were restricted to men with a premise that women cannot compete … .'. As a fighter, she was unsatisfied and expressed her opinions in a radio show. Thanks to the university's first female president, such regulations were changed to offering academic positions by the quality of the candidates, which provided opportunities for women to work as academics in Qatar since the mid-1990s. With the new policy, Sara received her first academic title as a teaching assistant. Unsatisfied with the teaching job, Sara followed the role model of her elder sister to continue her graduate studies and earned a Master's degree and Ph.D. degree from the U.K. With the continued support of the female president, Sara served as an assistant professor in science and engineering programs.

4.1.2. Self-perceived academic leadership role identity

While she was enjoying learning to become an innovative higher-education educator, she was appointed to become a department head at the start of the twenty-first century by being one of the earliest women Ph.D. holders in Qatar. Having no prior experience and no structured training, she started her leadership journey with a learning-by-doing approach. The primary preparation activity was a two-week study trip to the USA. She mainly learned how to communicate with others in her context, including top management, peer colleagues and students. As she explained, 'Before I was appointed an HoD, I wished I had more formal training. However, my experience in the department and my involvement on multiple committees helped'.

Her initial experience working as a department head was also accompanied by mixed excitement and nervousness. She explained,

> I was pleased because I had been planning for this post. I was also afraid, and I had the impression that certain individuals were unhappy with the idea of a Qatari woman heading the department, as they told me later. They expected me to be ineffective and incapable of adding value to the department, but I surprised them with what I achieved and accomplished in the department.

Sara **perceived the role** of a department head as overseeing all aspects of the department, including educators, students, scheduling and so on. According to Sara, the part involved 'setting up objectives, such as increasing the number of Qatari students in the department or based on the department's standing. Another important role was to increase research output in the department to improve the university's overall international ranking'.

Following her **beliefs**, Sara attributed her leadership development to a few **actions**: First, having a good knowledge about the department content work, referring to her prior experience of teaching and committee work, consulting previous leaders and prioritising students' interests. Second, she was hardworking, as she expected others to be.

Third, she **set up goals to** establish belonging and ownership to the department by caring for students' interests and involving colleagues in decision-making processes. Being one of the top departments at the university, she devoted herself to working with colleagues to **define their goals and develop strategies** to better their status. As she elaborated,

> I prefer to put together a committee and have them analyze the issue before making a judgment. If I believe that an individual decision is in the public's best interest, I try to persuade the committee to support it before approving it. I relied on my own experiences and the experiences of others to decide where there was a lack of consensus among the committee members.

She further illustrated this with an example of **actions on how to make department plans by allocating tasks and engaging colleagues**,

> As part of our annual planning process, we set the department's objectives regarding the department's overall vision and determined the competitions in which we can take part. I encourage my colleagues to focus on this topic, as we are relying on them to achieve these goals, and we design programs and competitions that do so. We worked hard many days for each achievement …

4.1.3. Challenges

At the same time, how to invest sustainably in human capital became a dilemma in her leadership role. She emphasised the importance of hiring people with high qualifications and profiles from international contexts. Nevertheless, this remained a challenge and obstacle in her leadership work since the formal procedures were time-consuming, with several layers of committee approval before a final rejection without clarifications from the higher-level decision-making board. As such, she aspired to change these policies but was prohibited by hierarchy and bureaucracy procedures. Another challenge she encountered over the years was fighting for longer-term employment for good professors to offer them sustainable conditions for quality teaching and research. This was also difficult to get through with the constraints of overall government policies.

4.1.4. Perceptions of gender

Generally speaking, Sara **perceived her leadership role** as a 'position of honour and esteem', with many enjoyable moments as she explained,

> The gathering of staff and students in my office or meeting room was one of the department's most enjoyable activities; celebrating our students' accomplishments, our students won international competitions, even though it was difficult to send them abroad because of a lack of financial support.

She also expressed reasonable confidence in her leadership role, which was built over years of experience and continuing engagement to self-reflect and improve her work, as she stated, 'even though men in Qatar are given preferential treatment in many sectors of life, the leader does not have to be a male'.

4.1.5. Future prospects

Sara was elected three rounds as the department head with her engagement and efforts. Nevertheless, with a pitiful feeling of being incapable of making bigger changes in the system, she decided to leave the position to focus on research after over a decade of overall positive experience. She reflected,

> We can't control everything, so we must be patient if we want things to change. How the university operates in hiring, decision-making and teaching may change, but we hope this will happen. Department heads submit their proposals to the administration, passing them to the university's governing bodies. This is a story about change.

4.2. Aisha's story

4.2.1. Journey to academic leadership

Aisha has been exposed to multiple cultures through her travels, with her father serving as an ambassador and her husband working as a diplomat. Her schooling experiences had impacted her life in several countries, including Africa, the Middle East, and the U.K as she recalled,

> As a child, science and technology have always fascinated me. My regular journeys broadened my horizons a lot. Agriculture, embroidery, painting, and music were just a few of the subjects I liked. When people are exposed to a wide range of skills and interact with many people from different cultures, their perspectives on the world are broadened.

4.2.2. Self-perceived academic leadership role identity

For Aisha, the most important **goal of her leadership work** is to help students. She participated in core department committees like curriculum, budgeting and strategic planning, which were necessary to accomplish this goal. She believed that the role of the department head is accountable for the department, serving as a representative for both the university and the department. In addition, she also sees her role as department head to be closely connected to frontline teaching work. As she elaborated, 'Academic administrators must not distance themselves from teaching to correctly make right decisions … the decisions we make should not be far from the classroom'.

The function of a department head for Aisha involved **multiple actions**, including curricula preparation for students, delegating tasks with the involvement of all department members, checking deliverables, fostering employee confidence and overseeing evaluation processes, in addition to many administrative meetings. On a daily basis, she acted as a team facilitator so that everyone could work to their fullest potential and feel safe at the same time. She offered ears to colleagues and considered treating employees fairly to be necessary. In addition, she made efforts to develop 'collaboration as a team', as she said. Due to the bureaucratic system, all paperwork became unnecessarily time-consuming, which made it challenging for her to manage time. She

allocated most administrative work to committees to gain consensus in decision-making. This often conflicted with the short timeline given by the university administration. Therefore she 'occasionally ignored submission deadlines because it is highly difficult to distribute the work or make excellent decisions in a concise period of time'. Another of her major strategy was to develop an objective evaluation process that was transparent for all department members to be fairly evaluated, as she elaborated, 'Having a clear policy for evaluating instructors is essential. It is a goal of everybody in the department to use simple language when discussing the evaluation process so that everyone can understand their own evaluation'.

Regarding preparation for the position, she referred to her prior experience as a program coordinator, which helped her gain an overview of department work and exercise administrative responsibilities. Having attended a few short-term training courses, she did not consider them highly valuable. For Aisha, 'experiences are more valuable than training workshops'.

4.2.3. Challenges

One of the most challenging parts of the job as a department head was balancing colleagues' diverse opinions. She aimed to be inclusive of colleagues' views on all department matters and to provide opportunities for people to interact with each other. It was not easy to have a balance in the final decision-making. For such, she set office hours to welcome colleagues' discussions, which nevertheless became a challenge during the COVID pandemic. Time-consuming administrative work was considered another major challenge for her department head role, as she said, 'For me, the administrative work includes a lot of paperwork and bureaucracy. Anyone in the administrative and educational process can handle developing plans and budgets. Because we base academic work on results, it takes greater concentration'.

4.2.4. Perceptions of gender

Aisha considered a gender difference in leadership styles, comparing female and male leadership styles by stating,

> I believe there is a difference, as well as benefits and drawbacks. Because of our many responsibilities, female leaders put in more hours each week and use more energy per task. However, we ultimately successfully accomplish our goals because of our special personalities and ability to handle multiple tasks together. For example, it is common for women to deal with issues on an emotional level compared to men, who are more capable of making judgments quickly.

At the same time, she also considered herself logical, which was influenced by her professional background in natural science. Serving as a department head for two rounds during different periods, she returned to her teaching and research position to focus on her academic development and promotion. This choice was also related to her passion and goals to further support students in Qatar. She said,

> Besides providing and empowering the students academically, I also try to raise their self-esteem. They usually feel that they are not good enough. For them to grasp the institution's significance, we work hard to instill confidence and self-assurance in them while raising their scientific knowledge and expertise.

4.2.5. Future prospect

She would continue to serve in different university committees to further support the institution, contributing with her experiences. Looking back, she enjoyed most of the department leadership work, as she recalled,

> One of the most fun things is the opportunity to celebrate achievement. When a program or project succeeds, when a program reopens after more than a decade of closure, and when you have an idea, and it succeeds, it makes me happy to see others' appreciation.

4.3. Maryam's story

4.3.1. Journey to academic leadership

Maryam experienced her schooling in different Arabic countries until she received all her higher education degrees in the UK. Being a high achiever in academic performance, she had a particularly strong interest in natural science subjects like biology and chemistry. At the same time, she also worked as a student leader as she said, 'I was a very, very active student at the time, and I led them, you know, a large number of activities related to school activities'.

With her rich experience in teaching, international collaborative research work, collaboration with industry and management work with students' affairs, Maryam was pleased to have chosen academia as her career, as she said,

> I feel I'm very good with people and I just feel that teaching can give you that continuity of keeping the knowledge fresh in your head. I also want to be on the frontier of science and learn something new, discovering something new. And these things in the industry may have jobs that are research-related and research-oriented, but you wouldn't have the teaching aspect of it. And I truly enjoy dealing with the students, and this is where I decided to select academia.

Later she moved to Qatar as a senior academic to explore new experiences, starting her new stage of career development. Initially, she took a survival strategy to get settled by adjusting her teaching style and re-orientating her research focus to fit the environment. As she described,

> As a new female faculty, I wasn't sure about my way around. So I just wanted initially to survive my teaching because of the different style of teaching that we had from the U.K … I just wanted to establish my research and try to reorient my research with the priorities of the country … and I just basically wanted to be genuinely be involved with the students.

During her first two years working in Qatar, she made effort to build a solid ground for herself, working in an environment where the majority of her colleagues were male. She felt the pressure in such a competitive environment. She stated,

> Everybody is excellent, everybody is hardworking and everybody is just fantastic. The competition is cutthroat; whether they are friends or colleagues in the department or other departments in the college, literally everybody is a high-level thinker. They are excellent people and knowledgeable people. So, for me, I just wanted to fit into that environment and try to put my stamp in my teaching.

She did not like the stereotype people often hold about being a good researcher, one has to 'be isolated in one's own room writing papers and stay away from interacting with people'. In a couple of years, her talents in organising students' events were observed by university leadership, in particular, the female president appointed her to a university-level middle management position working with talented students. In another few years, she was approached to return to her disciplinary field, serving as a department head.

4.3.2. Self-perceived academic leadership role identity

Being the department head was a demanding job in general, but for Maryam, she took it as a privilege when she was appointed, as she said, 'it was demanding by default, but it was also a privilege to be thought about as somebody who can lead the department'. For her, **the department head role** involves multiple aspects, including curriculum development, faculty member affairs, hiring, contract review, and student activities. 'No single day goes by without something happening', as she said.

In her middle leadership, she had a **goal of maintaining a balance between teaching, research, and management service**. For such, Maryam had **a deep belief** in the best way to lead to success is through efforts since there is not such a thing called luck. As achievements, she was awarded prizes multiple times, including university-level teaching merit awards and leadership in engineering in the Middle East region. As she said, 'I'm a goal-oriented person, and I don't like to be floating in the sense that my actions are always a reaction to what people do'.

To reach such a **goal**, visionary and hardworking were the keywords she used to describe her **role** as a leader, as she said, 'I would like to think that I'm a leader and a visionary because I'm not just the middleman. I'm not the secretary or just doing what the college wants'.

She **believed** working hard was essential for academic success in a male-dominated field. As long-term planning strategies, she took the initiative to mentor young female Qatari faculty members to develop their potential for academic promotion and leadership roles.

Proactively, another **action** she also managed to do was to update the curricula over the years with the introduction of new courses and removing redundant courses, which was a problematic initiative within the overall university system. Yet, she was determined to accomplish this task and felt proud of it 'I feel that there are things that I managed to lead my department in, and we did the bold steps to ensure that we revived some of the curricula, introducing new courses and introducing a new program'.

4.3.3. Challenges

She also believed time and effort as the most challenging aspects of her role as a department leader. Dealing with multiple groups of people, such as students, faculty members, lab safety, resources and accreditation, and communicating with top management at the university, involved tremendous responsibilities, which took time. As she said, 'Basically, I find it a bit stressful because I strive to do a good job. I'm not saying I want to do a perfect job, but I try to do an excellent job in management and still maintain some research interests'.

Without formal training or preparation, Maryam's journey in middle management leadership was through learning from 'trials and errors, lots of tears and stress to start with'. Her prior experiences serving on committees helped with her knowledge about the department. While she learned from lessons and experiences over the years, she made sufficient efforts to keep going.

> I've never worked harder or longer hours in my whole life. I feel that being a head of the department is the most challenging position I've been in because you are dealing with so many different layers of the job.

Positively, all her efforts led to good learning and growth

> I am less bothered by things that used to stress me years ago, and I have built good relations with the surroundings. I see my colleagues as good friends, and I love being part of the management team at the college.

4.3.4. Perceptions of gender

Maryam's reflection on her gender role and leadership seemed to be replete with dilemmas. Initially when she was appointed department head, she received different reactions, some welcoming while others were doubtful. She chose to talk to people one by one to convince them, 'some people may not have wanted me as a department head because I was a woman, but I told them, try, then we find out. It turned out to be a short period until they dealt with me'.

Feeling respected in a supportive environment, Maryam did not consider herself discriminated against or treated differently being a women leader, 'If I reflect on what I have, I never found that being a woman here was a hindrance. I did feel it in England, but not here. We have wonderful management in the college, very supportive and respectful … '

In addition to the current supportive deanship, her confidence was also related to the role model of the female presidency,

> when I first came in, women were leading the university, and I never felt from my colleagues that being a woman, I'm less respected or less thought of. I faced challenges when I was in two different universities in England, and being a woman made a difference. You are sometimes overlooked for promotion or overlooked for other things. The men can go out and stay after work on a Friday night to do whatever, and you have to go home to your own kids and make dinner and things like this. So there, I did feel to a certain degree being a woman in engineering had its challenges …

On reflection, she also pointed out the conflicts between her diverse roles of being a successful academic, an administrative leader, and domestic role as a mother and wife,

> I was not discriminated about, but I did feel that I had to do twice or three times as much to be able to manage the same job as maybe my male colleagues. I worried about going home, making sure there was food on the table for my family, making sure I was balancing my life with family duties, with respect to my husband, schooling issues with my child, and the bigger family in general. So that was putting a lot of demand on my time and stress.

Her seemingly contradictory reflection also revealed her struggles balancing work and life. Instead, she used the term life-work integration to express her managing strategy, ' … the concept of life-work balance is rubbish, I decided that I need to have life-work integration instead of like balance and to reframe certain things in their different perspective … then it makes things better to handle'.

Another aspect of getting empowered was from female peer leaders,

> the most successful things and discussions came from a group of women at the management level at this university, and we started to meet regularly now and then to bounce ideas. Sometimes just to have a coffee and just be our support system.

4.3.5. Future prospect

In general, although 'it was not part of what I planned, but was sort of where I came', Maryam considered her experience serving as the department head 'an enjoyable journey useful for career development'. She believed that leadership roles were temporary experiences for academics. At the same time, research and teaching were most essential,

> your main home is being a faculty who is teaching, doing research and services regardless of what chair you're in. So you must ensure you're fair and firm and have that continuity. So just be good to people. Try to empower them, listen to them, and get on with the job.

4.4. Cross participant analysis

All three participants perceived themselves as goal oriented, and defined their role as department heads as an all-in-one job, including curricula, students, faculty, facilities, policies and communication externally. Such commonality can also be related to their shared belief in a collaborative approach to leading their department highlighting positive relationships and teamwork. Following such, they were determined to set up the goals of taking responsibility and accountability for their departments. Such commonality may be directly related to their similarity regarding educational experiences in both Arabian contexts and European countries. Nevertheless, different approaches in actions were observed with Sara and Aisha, who both were from Qatari higher social class families. They expressed more confidence and secure feelings in confronting the larger scope of organisational hierarchy and taking actions for the visions and benefits of their own department. Maryam, who had a long living experience in European contexts, tended to compromise due to perceiving 'less space to fight'. For similar reasons, Maryam expressed more concerns about the dilemma of the dual role between having a career and taking care of her family, which may be related to Qatari traditions regarding female roles.

5. Discussion and conclusion

A critical discourse analysis approach (Mullet 2018; Wodak and Meyer 2009) to interpreting the narratives of the three women academic leaders in STEM offered opportunities to capture the rich, complex, dynamic and contextualised nature of how the participants negotiated their identity formation (Garner and Kaplan 2019; Kaplan and Garner 2017, 2018). Such negotiations occurred through their discursive practices of doing gender (Butler 1990; Danielsson 2012; Silfver et al. 2022) and doing leadership in their academic leadership roles.

In this study, the DSMRI model (Garner and Kaplan 2019; Kaplan and Garner 2017, 2018) offered an interesting angle to explore the participants' goals, beliefs, perceptions, and action possibilities as women academic leaders in STEM. Supported by their own prior experiences, these participants set up clear goals of leading their department with the values they believed in. This finding corroborates with similar findings from a recent study on women school principals in Qatar regarding their educational leadership goal orientation (Vogel and Alhudithi 2021), which is a value highlighted as masculinity in literature cross culture (Vogel and Alhudithi 2021). Their value-driven goals and strong beliefs that they could do well in academic leadership positions (both professorship and department heads) by being women reflected on their engagement with societal transformation, while their dynamism highlight shared values and openness to change (Lari, Al-Ansari, and El-Maghraby 2022).

Regarding self-perceived middle management roles and action possibilities, participants mentioned different individual, relational and institutional aspects. At an individual level, the importance of knowledge and skills was emphasised in becoming a leader. In preparation for their leadership roles, none of these participants had been offered structured training or professional development activities to become prepared for their role as department heads. This may be attributed to a general lack of systematic support in the 1990s and the beginning of the twenty-first century (Layne 2010). Similar to previous studies (Del Favero 2006; Layne 2010), they relied on their own experiences (Vogel and Alhudithi 2021) and familiarity with the environment (department-related work). They adopted a learning-by-doing approach to grow through reflection on their experiences, echoing the similar way of growing into leaders in Qatar and other countries in the Gulf Region (Vogel and Alhudithi 2021). Such an approach emphasised relational aspects of leadership roles (Layne 2010; Marinelli, Male, and Lord 2021) by seeking feedback from students and faculty members and by constantly asking themselves in which ways their new efforts were effective. At the institutional level, all of them mentioned establishing a culture of trust, belonging and ownership through engaging faculty members, which reflects connectedness from a complex system perspective (Morrison 2008). In general, participants in this study underline respect and trust, and make efforts to enable collegial support to better motivate individuals to act. This result aligns with what was suggested by a previous study in that women leaders in Qatar are predominantly reflective of transformational leadership highlighting the encouragement of open communication, relationship development and trusting building (Sharif 2019).

Contributing to the DSMRI model, this study also observed the role of diverse social cultural factors that influence the motivational factors of these women leaders and negotiation of their role identities within their local context. First, their path to leadership may be inspiring and motivating for the career development of the younger generation. All the participants chose an academic journey in STEM initially driven by their interest in science, and mathematics, as many women academics in STEM have done (Du 2006; 2009; Tonso 2006), which was followed by their passions in teaching and care for students. They were engaged in pursuing academic careers with the inspiration from a role model, namely the woman president at that time, who also appointed them as department heads to develop their leadership potentials, which was considered a vital source of empowerment (Hill and Wheat 2017; Lopez and Duran 2021). Through open-minded family support, experiences of seeing the world and study experiences in the USA or UK, these participants were equipped with 'Western' mindsets about women's agency in academic leadership, such as speaking out opposite opinions in public, explicitly stated by Sara and Aisha. This kind of agency led to their encountering a double bind – between being the leaders they believe in and being a woman in a male-dominated environment (Layne 2010; O'Meara 2015). Nevertheless, they all chose to connect their femininity of being kind and caring with the ideology of leadership roles such as confidence, decisiveness, forcefulness and risk-taking, which are often linked to masculinity (Del Favero 2006; Eagly, 2007; Layne 2010; O'Meara 2015; Rudman and Glick 1999). The concerns about the dilemma between being a busy leader and having a family role – mother and wife by Maryam may be related to spending several years living in Western countries, where women's careers are challenged by their dual roles and life-work balance (Fritz and Van Knippenberg 2018).

In particular, a gap has been critically analyzed between the official policy of supporting women's work-life balance and the reality in which women are expected to be responsible for their own balance in a 'work-friendly way', resulting in burdens for women (Nikunen 2014). In this aspect, with the privilege of access to resources and sufficient domestic support (e.g. family and house helpers), such as in the case of Sara and Aisha, women seem to achieve a better balance in their lives (Salem and Yount 2019).

Further, emotions, playing a central role in knowledge and identity formation (Tonso 2006), were also addressed throughout their discursive practices of doing gender (Butler 1990). These emotions, across all three levels, ranged from feeling excited to get into the STEM field, to becoming passionate about teaching and caring for students, to seeking feedback and recognition from faculty members, to proving their own success with pride in their organisational context (Kulik and Olekalns 2012; Ong, Smith, and Ko 2017; O'Meara 2015). Additionally, networking (socialisation opportunities with people with power) has been highlighted to be a significant contributing factor to leadership development, which has been historically related to men, yet recently also more associated with women in Denmark (Ottsen 2019) and Germany (Sagebiel 2018), but still less accessed as a resource for women to develop leadership due to the societal segregation (Lari, Al-Ansari, and El-Maghraby 2022; Ottsen 2019; Sharif 2019). Nevertheless, this study suggested that family support and network building among women may be used as strategies for self-empowerment.

While all participants mentioned the additional workload as middle academic leaders (Freeman, Karkouti, and Ward 2020; Thornton 2020), they seemed to accept this aspect as part of their leadership role. Nevertheless, they felt worried when their academic identity (Van Lankveld et al. 2017) was threated by their struggles between being a good department head, which is a highly time-consuming job, and being a good researcher, which also demanded time and concentration. While Sara and Aisha chose to leave their leadership positions to prioritise their academic identity by focusing on research and teaching (Van Lankveld et al. 2017), Maryam was still trying to find a balance at the time of the study. While Maryam demonstrated more contradictory discourses revealing her struggles in balancing her multiple roles – being a mother, expert in research, good teacher and department head – she chose to be persistent in her success (Ong, Smith, and Ko 2017) and continued to exercise her leadership agency in her organisational context (O'Meara 2015).

These findings provide a few practical implications. Firstly, a mandatory structured professional development system including formal training was suggested by participants of the study, echoing suggestions by Marinelli, Male, and Lord (2021) (e.g. workshops to clarify the roles middle academic leaders are expected to play). In addition, formally structured activities can be linked with informal learning opportunities, including learning communities for network building among women leaders and in mixed gender-modes (Sharif 2019). Additionally, mentorship relationships (Hill and Wheat 2017; Lopez and Duran 2021), such as the role model they mentioned, and learning communities through discussions and experience-sharing with peer leaders are also necessary (Thornton 2020). Further, an open-environment welcoming a diversity of leadership styles and preferences is needed; one where values that have been historically been associated to femininity including motherly care, building connections and relationship (Sharif 2019) should be supported in this context (Del Favero 2006; Du and Kolmos 2009; Eagly, 2007; Preston and Floyd 2016).

This study has a few limitations. Firstly, although using a qualitative narrative methodology through life histories provided in-depth insights into how these women academic leaders in STEM perceived their role identities in their career path, the small size of the participants allows for limited transferability. There may have been different stories by other women and men middle management leaders in STEM and beyond. Second, the current study adopted a critical discourse analysis (CDA) approach to convey knowledge, enabling participants to emancipate themselves from domination through awareness and self-reflection (Wodak and Meyer 2009). Nevertheless, this may also place power in the researchers regarding certain social groups' knowledge, ideologies, and values, e.g. privileging women's leadership. There may be other perspectives to examine the reality of their practices, which may provide other findings by interpreting their life

stories differently. Therefore, future studies may seek a more significant variation of career path to academic leadership and approaches to doing gender, including multiple data sources and more participants addressing intersectional factors to comprehensively examine gendered practice in negotiating academic leadership. Further, as the number of women in academic leadership roles increases, their values spread through doing gender, doing leadership and doing STEM. Therefore, it will be interesting to aspire for a future of diversity in the profession. This study was embedded in a single institutional and societal context, providing limited space to compare with other stories. Future studies are recommended to adopt comparative strategies involving opportunities to hear more voices of STEM leadership and addressing multiple social cultural backgrounds. A final reflective note, while literature addressing Northern American and European history often relate women's improved empowerment to their active participation in obtaining power through negotiating their conditions, studies in the Middle Eastern context tend to relate women's improved social status as a consequence of economic growth and in particular the support of the government in the context of Qatar (Salem and Yount 2019). While this study provides little insight into this phenomena, future studies are suggested to further compare different approaches to gendered practices in women empowerment to explore a sustainable way to social equity at large.

Notes on contributors

Dr. Saba Qadhi is an experienced educator and scholar who has been working in the field of education for over 23 years. Currently, she serves as the Director of the Core Curriculum Program and an Assistant Professor of Educational Sciences at Qatar University. She received her Ph.D. in Education from the University of Reading (UK) in 2018, and her master's degree in Educational Leadership from Qatar University in 2009. Dr. Qadhi has held several leadership positions at Qatar University, including coordinator of the secondary and primary education programs, and Associate Director of the Core Curriculum Program. Her primary research interests include educational and continuing professional development (CPD) for teachers and instructors in the educational field. She supervises master's theses in the College of Education and has published two book chapters and several articles in peer-reviewed journals. Dr. Qadhi has secured two research grants, including an NPRP research grant and an internal grant from Qatar University QUCP. She has also served on many key committees and task forces at various levels in the college, Core Curriculum Program, and the university, working to develop and improve the educational process. Dr. Qadhi's extensive experience and contributions to the field of education make her an invaluable asset to Qatar University and the wider educational community.

Dr. Youmen Chaaban, Ph.D. is a Research Associate Professor at the Educational Research Center, at the College of Education, Qatar University. Her research interests include teacher professional development, professional agency, and teacher leadership. Dr. Chaaban has over 50 research publications in international journals, including original research conducted in Lebanon and Qatar. She has also been actively involved in a number of teacher education programs and professional development programs, where she has held the positions of dean, head of department, curriculum coordinator, and educational consultant.

ORCID

Xiangyun Du http://orcid.org/0000-0001-9527-6795
Youmen Chaaban http://orcid.org/0000-0002-3708-3722

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