



The Dual Role of Women and Digital Literacy in Improving the Performance of the Home and Industrial Social Center of the Fisherwomen's Group

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Abstract

This paper explores how fisherwomen in Makassar mediate the compounded tensions of family obligation and economic labor of co-operation as they adjust to digital technologies in the Home and Industrial Social Center. With a qualitative descriptive design, which is supported by phenomenology and has a linkage-bridging viewpoint, the study looks at how digital literacy is transforming quotidian practices, moderating collaborative practice, and intertwining with culturally normative values that command shared practice. Fifteen participants were interviewed using in-depth interviews and participant observation and reviewed documents, which allowed gathering data related to the pragmatic experience, as well as the emotional and embodied aspects of digital engagement. The results suggest that the digital literacy is a transformative force that broadens the market, enhances the efficiency of the operations, and strengthens the feeling of agency in the fisherwomen. At the same time, it is associated with new stressors, such as physiological exhaustion, time disruption, and increased domestic tension levels in regard to prolonged online activity. Instead of reducing the dual burden, the digital tools re-structure it into a hybrid taxonomy of domestic, manual and digital work which the women have to negotiate all the time. The analysis of linkage-bridging shows that internal resources (siri Naa pacce and peer-based learning) are compatible with external digital resources to enable adaptive capabilities within the cooperative. This overlap brings about the Dual Digital Bridge framework which illustrates how local cultural values can be made in line with technological innovation in coastal locations.

Introduction

Makassar has always been the city with the traits of a seaport whose social and economic existence is the dialogue with the sea. Fishing is not just an industry here, but a beat that affects the family institutions, the societal values, and the normal day to day dealings. In this maritime world, fisherwomen play a special role in the provision of not only the economic well-being of their families but also the preservation of cultural knowledge which is rooted in the traditions of the coast. They are integrated in actions that range between the processing of catch to general management of household economy as well as being involved in communal decision-making. The Fisherwomen group, locally referred to as KWN is a structure whereby such contributions become more visible and have a purpose behind them. The women cooperate and work together through participation in Home and Industrial Social Center (HISC) in processing marine products, group marketing and mutually support each other (Sari et al., 2024; Lin, 2023; Solano

et al., 2021). The HISC turns into the place where personal competencies are blended into the group work that enhances the resilience of the community.

But under the fruitful thrust of the cooperative there is a more tactful reality influenced by the duality of the roles that most of these women live in. They usually get up early in the morning, domestic demands wake them up to the schedules of cooking, taking care of the children, and cleaning the house. Only then when they fulfill these immediate obligations can they take the roles they need to fulfill the cooperative be it the processing of fish, making of orders or meeting that they must attend. This commuting of home and cooperative is not done in blocks of time. Rather, roles tend to overlap in a manner that sets up rhythms that are competing, which forces the women to constantly bargain on which side of their attention to focus. The two-fold weight that emerges as a result of this overlap becomes one of the key aspects of their lived experience and is bound to influence the performance, sustainability and inner workings of the HISC (Sugars, 2022; Vale et al., 2022).

With these realities afoot, the growth of digital technology comes into play not as a far off event but as a growing power of the community existence. Digital literacy opens the opportunities to minimizing the limits of mobility, easing the communication process and increasing access to those markets that are far beyond the local coastal setting (Ollerenshaw et al., 2021; Junod et al., 2025; Subekti et al., 2025). The fact that fisherwomen can control areas of production and sales using a mobile phone gives them a certain level of flexibility, which conventional systems do not always give. The positive outcomes can be noted: online services will allow the women to find new customers, keep transparent accounts, organize the work of the groups, and become more engaged in the economic aspect of the cooperative. Digital devices promise to be efficient and build autonomy and recognition in the household and within the community.

Nevertheless, these promises are encircled by restrictions that are connected with socioeconomic and cultural background of the women (Hassan et al., 2011). The avenues to smartphones are not equal; the internet penetration is biased in neighborhoods. Most of the women are interacting with the digital tools at a level of introductory exposure or reluctance. The difference in generations and their respective level of formal education, as well as the emotional burden of the necessity to balance digital activity with the continuous need to perform domestic duties, affect their learning process (Sosa Díaz, 2021; Walker, 2021; Dogra & Kaushal, 2022). Sometimes introduction of digital tools presents new strains where notifications would be received at late times of the night or responsiveness require is unresponsive due to caring duties. These strains are indicative of broader trends in most coastal areas where digital transformations are both conditioned by structural factors and individual impetus.

It is on this background that the endeavor of the present study will be placed at the crossroads of dual identity of women and the changing nature of digital interaction. It seeks to explore the meaning of interactions between domestic obligations, cooperative work, and digital literacy to fisherwomen in Makassar. The exploration defines the tactics that women use to cope with disjointed time systems and discusses how the traditional skills of dealing with fish, resource conservation, and mass labour can be converted into valuable digital resources (Pratiwi et al., 2023). These questions are discussed under a qualitative phenomenological perspective by focusing on the experiences of the women in their lives. This is supplemented with a linkage-bridging view that follows the relations between internal cultural resource and external technological possibilities. Combined, these methodologies help the study to go beyond a simplistic definition of digital literacy as a set of skills and see it as a developing process that

is entrenched in the cultural values, social relations, and manifested in everyday practices instead.

In making this enquiry, the study is also involved in a wider intellectual debate on the issues of gendered labour in the digital transformation. However, researchers are becoming aware that the digital adoption process in marginalised or rural societies is not a vacuum and is influenced by gender norms, household demands and established patterns of labour that are frequently overlooked in any official economic discourse. The stories of fisherwomen in Makassar also add to this discourse by showing how digital technologies may connect to the traditional duties and how empowerment can happen in (nonlinear) and deeply relational ways. Based on their accounts it can be seen that adjusting to digital practices is often a collective learning process, an emotive negotiation process, and a physical and social level of resilience.

The study aims at enhancing our knowledge of the way the women living on the coastline derive their sense of digital inclusion and how their technology use alters not only their role in the economy but also the social relations in their families and communities by preempting these dimensions. The study underlines that any attempt to empower the performance of the HISC or to advance the process of digital empowerment should take into account the realities that guide the daily decisions of these women. Their experience requires a more subtle mode of empowerment, one that respects the fusion of tradition and creativity, agency and community, and the tangible results of digital technologies as well as the invisible labour that makes their usage feasible.

Literature Review

Women's Dual Role

The dualism of women has been a long-debated phenomenon not only as a descriptive situation but also as an experienced conflict, at the interplay of housewifery and civic involvement. This dualism is felt especially strongly in the life of coastal communities, as both the routine of the domestic environment and natural cycles of the sea are the determinants of daily life. Women are supposed to maintain emotional and logistical stability at home, take care of children, food production, and relational labour in addition to being productive in micro-enterprises or fisheries-related work. Even researchers like Deb & Haque (2011) demonstrated that the impact of fisherwomen on the economy is significant most of the time, but that there is always a price with all this success: a physical and emotional torture. The complexity can be explained with the help of Role Conflict Theory (Kahn et al., 1964), which allows defining the antagonistic claims of time, energy, and identity that a woman has to constantly negotiate. This in reality implies that women in coastal MSMEs do not operate in compartments but rather in overlapping spaces that do collide the day out. This stratified reality is on which this study establishes the basis of the experiences of the female members of the KWN cooperatives in Makassar.

Digital Literacy

The conflict of both roles of women has placed digital literacy, in current research, as a possible solution, as well as an area of negotiation. McDougall et al. (2018) says that digital literacy goes beyond working with the device; it involves the interpretation, assessment, and deliberate application of digital tools in correspondence with social and economic goals. The necessary skills of the coastal micro-, small, and medium enterprises (MSMEs) include online financial management, online communication, brand building through social media, and the ability to operate in the marketplaces based on algorithms. As it is shown in the studies conducted by Khan et al. (2025) digital literacy can facilitate turnover, reduce operational inefficiencies, and

provide new opportunities to reach external markets. Still, online interaction requires sustained mental attention and a degree of responsiveness that can not be consistent with disjointed home time. As a result, digital literacy is the double-edged tool, which is empowering, but puts a considerable cognitive and time burden on it. This conflict intuitively predicts the questions of how actors most benefit as a result of digital opportunities and how they are most challenged by the need to adapt.

Digital Gender Gap

The tension described above is also increased by the ongoing digital gender gap that dictates the access of technological tools to the individual and places people on the outer side of digital changes. Hilbert (2016) defines this gap not only as a difference in access to the device but as a complex construct that is influenced by income, education opportunities, infrastructural access, and cultural standards. Sarker et al. (2021) discover that women in the coastal areas always have less digital means compared to their male counterparts, be it in the number of smartphones they have, a steady and uninterrupted internet connection, or in their familiarity with digital training. Although women are highly motivated to learn digital skills, they often face the structural barriers to their full involvement in digital platforms. The divide is specifically acute in collaborative contexts, in which unequal digital abilities can divide group cohesion, create reliance on more digitally capable group members, and aggravate within-group disparities. A subtle conceptualization of the digital gender gap is, therefore, necessary to explain the inability of digital literacy to intervene to resolve the wider ecosystem of limitations facing fisherwomen.

Coastal Women's MSMEs

Shifting the gendered aspect of access to digital technologies to the wider context of coastal MSMEs, empirical research portrays these ventures as being both resourceful and vulnerable at the same time. In their communities, cooperatives of coastal women usually rely on the well-established social ties, insecure forms of trust, and similar values to keep the economy active (Mozumder et al., 2018). However, these strengths are coupled with structural weaknesses such as a lack of capital, unstable supply chains, and local markets. The cooperatives of fishers regularly act as economic and social spaces in which knowledge, sense of morality and shared tactics are developed. Nevertheless, studies suggest that the inclusion of digital tools in such cooperatives is not easy; the digital solution needs to be supported by stable infrastructure, regular training, and the application should be culturally sensitive, which is not always the case in coastal communities. These difficulties suggest that coastal MSMEs are subject to the dynamic interaction between internal resources (including social cohesion, collective labour, shared identity) and external forces (market forces, technology changes, policy conditions). It is through this interaction that there is a need to have research methodologies that consider both the personal abilities as well as group process of adaptation.

State of the Art (SOTA)

Recent research (2020-24) recognizes a number of new research directions that directly guide the current study. First, a body of empirical evidence supporting the existence of the digital gender gap in Eastern Indonesia especially in rural and coastal areas continues to be growing. Though they offer good evidence, they do not give a comprehensive look at cooperatives or community-based units because they only emphasize on single participants. Second, researchers prioritize micro-learning as one of the solutions to time fragmentation that women experience all the time. Conducting training in cursory and adaptable on-demand modules is agreeable to the multi-role agenda of women; nevertheless, the current literature has not

ventured this novelty to performance-based measurement tools and collaborative evaluations. Third, the discussion of the transfer of domestic knowledge into entrepreneurial value has taken root, implying that the intimate knowledge held by women about food preservation, budgeting and management of household resources could be turned into competitive business resources. However, the cultural notions like *siri na pacce* are seldom incorporated in these discourses and the standardization, digitization and scaling of domestic competences by means of cooperative models are also not covered. These loopholes draw the intellectual map onto which the current study intrudes.

Novelty of the Current Study

To address the gaps identified, this study makes new contributions that push and stretch already existing theories. The Collective Digital Double Agency Model combines the relationships of the dual role of women, digital literacy, and the empowerment realities of collaborative-based businesses and thus preempts the emergence of collective agency as opposed to individual adjustment. The Fragmentative Digital Literacy Scale is a new measurement tool designed to address the discontinuous time-related aspects of fisherwomen which allows measuring the digital learning results and conversion of domestic-to-digital skills more accurately. Lastly, the developed Ecosystem-Based Intervention Design, built on the framework of coordinated 15-minute community micro-learning sessions, ecosystems digital empowerment into the temporal flows of the everyday life of the coastal women. In combination, the above contributions produce a more grounded, culturally informed, and context-sensitive understanding of digital empowerment in maritime societies.

Methods

The given research takes a qualitative descriptive design with an addition of a linkage-bridging analytic approach. Instead of just explaining social phenomena, the approach to methodology aims to shed light on how variables, experiences, and contextual forces interrelate and support each other in the real-world of fisherwomen in Makassar. The qualitative design is chosen on the ground of its aptitude to capture lived experiences in addition to allowing the researcher to trace subtle relational dynamics between dual roles, digital literacy, and collaborative performance dynamics that quantitative approaches habitually ignore. In this way this study frees the one-dimensional analysis of variables, but builds a story of interrelated processes that determine the socio-economic realities of women.

Linkage-Bridging Approach

This study has the conceptual support of the linkage-bridging approach. Simply put, linkage is the methodical mapping of correlations between internal resources, including cultural values, domestic knowledge, and social capital, and external ones, including digital resources, institutional backing, and access to the market. Bridging on the other hand involves the issue of how these linkages create avenues that bridge the gap between theoretical understanding and day-to-day practice. This two-polar structure has placed the research not only as an academic practice but also as a prism through which women are able to adjust, negotiate, and be creative in a complex socio-ecological setting. Through linkage-bridging, the paper constructs the role distribution re-constituted by digital literacy, the cultural norms that regulate the use of technology, and the dynamics of groups of people that amplify or inhibit the agency of an individual.

Research Location and Time

It was conducted in Makassar, in the Fisherwomen Cooperative (KWN) which runs the Home and Industrial Social Center (HISC). The site was chosen purposely based on the purposive logic because it represents the focal point of domestic work, economic involvement, and the new digital practices, and thus, it is the right place to explore the phenomena of interest. The temporal frame of the study is three months (August- October 2025), which would be time enough to conduct the immersive fieldwork and allow the periodic cycles of the coastal livelihoods. This long-term involvement helps the researcher to monitor change in everyday practices, collaborative work, and seasonal requirements that inform the practice and negotiation of digital literacy.

Informants and Sampling Technique

Since the study has a phenomenological disposition, informants are not taken as statistical entities but as meaning-carrying participants who are situated within a unique social environment. In line with the ideas of qualitative inquiry, purposive sampling was used to select informants who had first-hand experience of being in a dual household and digital presence when it comes to cooperative management. The only inclusion criteria were: (1) the individuals who were the members of the Barukang Women Fishermen Cooperative; (2) who have been working with this cooperative at least one year; (3) people who used digital media either directly or indirectly to conduct business or coordinate business. Fifteen key informants were chosen, not to have numerical representativeness but providing depth, experiential breadth and richness of stories. Their experiences form the experiential basis on which the interpretative analysis is based.

Data Collection Techniques

To achieve the layered and lived quality of the lived experience of the women, the study placed in to focus on the experience of the women, triangulation of in-depth interviews, participant observation and document analysis was used. The 60-90 minute in-depth interviews will give the women a chance to narrate their stories, emotional bargains and adjustments of the technology. These interviews were semi-formatted and aimed to give enough guidelines to explore the research focus without impeding the openness needed in the phenomenological exploration.

Participant observation also increased the believability of data as it helped the researcher to observe first hand how the production is coordinated, dual task are handled, and how digital tools are integrated into daily activities. Fieldnotes reflected in observations were used to capture all actions that could be seen but also the atmosphere, physical gestures and micro-interactions that could not be fully revealed during textual interviews. Supplementary to such approaches, document analysis included the analysis of cooperative records, digital communication archives, training materials, and relevant policy documents. In combination, these methods produce a multidimensional perception of the phenomenon.

Data Analysis Technique

The analysis of the data is made according to the principles of Interpretative Phenomenological Analysis (IPA) as explained by Cuthbertson et al. (2020), and the relational logic of linkage-bridging. The analysis starts with the careful preparation of data, it includes the transcription of interviews, organization of field notes, identification of relevant documentation. The researcher then absorbs oneself in the data by reading and re-reading all the materials to the end of coming up with a comprehensive view of the story of each participant. Coding is used

to recognize segments of meaning and group them into thematic categories of dual-role negotiation, digital adaptation, family dynamics, somatic experiences, and cooperative based learning.

Stated thematic clusters are then plotted into a linkage matrix to see the interactions between variables so that the researcher can find patterns of reinforcement, contradiction, and transformation. The bridging stage is a process that incorporates these relationships within internal facets with wider contextual aspects like cultural practices, digital resources, and social and economic systems, thus generating an interpretative narrative that shifts the personalized meaning to systemic descriptions. Lastly, the themes are synthesised into a narrative of interpretation which portrays the subjective experiences of the participants as well as the structural conditions that define their lives.

Result and Discussion

The results of this study are represented in a profound phenomenological and linkage-bridging perspective. The analytic coherence is achieved by integrating the tables that summarise the main patterns into the story and providing the detailed explanations of the interpretation. Such a structure allows the results to develop progressively with the lived experience of the women moving to the structural relationships and embodied meanings. The discussion exposes how fisherwomen negotiate between the domestic, cooperative-based economic dealings, and the digital activities.

Themes of IPA Analysis Superordinate

The interpretative phenomenological analysis revealed four high themes which are showing emotional, relational, and embodied relations of the everyday life of women. These themes show that digital literacy is not simply a shift in technology but a re-inscription of identity, time, domestic dynamics and the experience of the body.

Table 1. Thematic Summary of Participants' Narratives on Digital and Domestic Labor

Superordinate Theme	Subtheme	Meaning Description	Participant Narrative
Identity Duality	Internal Conflict	Emotional tension between domestic responsibilities and cooperative demands	"By three in the morning I'm still finishing orders, and by nine I already need to be at the cooperative meeting. My whole body feels like collapsing, but if I slow down even a little, everything else falls apart."
	Negotiated Time and Space	Smartphones used to create continuity across conflicting roles	"While watching my children at home, I can still respond to customers. My phone is what allows me to work without having to leave the house."
Digital Literacy as a Double-Edged Experience	Empowerment	Growth in confidence and financial agency	"I used to ask people to help me transfer money. Now I manage everything on my own. It feels good to know I'm capable and not dependent anymore."

	Digital Burden	Pressure arising from constant connectivity and long working hours	“Customers message me late at night. I’m tired and sleepy, but I still reply. I’m afraid if I don’t, they’ll just buy from someone else.”
Household Power Shifts	Increased Respect	Husbands acknowledging women’s contributions	“My husband respects me more now. When he saw my sales growing, he said, ‘I never realized you were this capable.’ That was the first time he ever said something like that.”
	Tension and Jealousy	Emotional friction triggered by phone usage	“Sometimes he gets annoyed because my phone keeps buzzing. He says I care more about my customers than about him.”
Embodied Struggle	Physical Fatigue	The body carries the weight of hybrid domestic and digital labor	“My body aches everywhere... my eyes burn, my back hurts. But I keep going because this is what keeps our household running.”
	Digital–Physical Friction	Stress from managing manual and digital tasks at once	“One hand is kneading dough while the other uploads photos to Instagram. Sometimes I don’t even know which one to focus on first.”

The accounts of the women give an in-depth insight into a mundane life where one is rarely given the chance to take a break. Their testified accounts shed light on the way in which domestic duties and obligations associated with their digital labor collide in ways that appear as inevitable and inadvertent. When one of the participants talks about making the orders at 3 am. and then getting to a cooperative meeting a few hours afterwards, she is not exaggerating her fatigue, but that is a pattern that has developed. The stress that she has is not based on the tasks as such but that she thinks that none of the tasks can be postponed. Her description shows that, despite digital participation not making her life easier, it prolongs her day and makes pregnancy practically luxurious. What comes out is a portrait of women who silently assimilate numerous roles since taking a step back, even momentarily, is to take down the whole construction they have labored so hard to maintain.

This constant motion is more evident when they talk about smartphones. Most of them do not describe their phones as a tool but as a companion that is always close when they are cooking, watching over their children or even taking a short break. The device creates continuity in the presence of the two between homes, cooperatives, and online marketplaces, where segregation would have been otherwise. This freedom is valued, but they become even more conscious of the infiltration of the digital environment into all aspects of their everyday lives. A mother can be sitting on the floor alongside her child and at the same time bargain with a customer who she has never seen. The overlapping nature of these scenes shows that the digital labor alters not only the time use, but also attentional distribution. Roles overlap, making it impossible to

separate responsibility areas, to form a hybrid existence, which is practical and overwhelming at the same time.

This amalgamation is enhanced by their expanded digital literacy. Some of the participants also comment on the pride that they feel when dealing with financial transactions or internet interfaces on their own. The pride is not in wanting to master technology as an end in itself but a sense of independence. They study, as it is a part of work, and in this part, they find a new ability. Nevertheless, this competence leads to more pressure. Clients still write long after office hours, and most women will answer when they are half asleep since not to do so may result in a lost sale. The feeling of this arrangement is emotionally sophisticated as they describe it. Digital ability gives them power, but it also ties them to a 24-hours-a-day marketplace. They take pride in what they are capable of and at the same time, they know too well that the digital environment comes with request that do not even consider fatigue.

These developments spill over into domestic affairs. Women have frequently observed that their husbands now see their potentials with some form of tentative approval. Even a mere compliment about greater sales can have some emotional value in it since this is a sign of a change in the way their efforts are viewed. However, this recognition does not last long. In some cases, husbands react to the phone when it rings with irritation, because they consider the phone as an attention seeking device. These small grabs reveal the shaky landscape that the empowerment is realized. Online success broadens the agency of women, but also raises concerns of demarcation, devotion and time, which a couple has never had to bargain before. With paying attention to the tensions, we can see that empowerment is not a straight path; it is something which is influenced by the negotiation, compromise, and misunderstanding situations which become a common part of our daily life.

All these negotiations are centred on the bodies of women. They talk about the weight of their arms and legs, about the soreness of their tired eyes, and the aches that travel over their shoulders when they have worked long hours. They are not fatigued symbolically but viscerally. Digital entrepreneurship might sound as something flexible, but when it comes to their hands, it introduces an extra dimension to the physically action-oriented routine. One of the participants is kneading dough with one hand and choosing photos to post with another one. She exists in the realms of both the manual and the digital, at the same time experiencing the burden of it. Her experience highlights that digital work does not remove physical labour, on the contrary, it requires simultaneous attention, which puts a body to a strain in unconventional ways. These descriptions make us realize that hybrid labour is not the multitasking simply; it is a physical sustenance that defines the way women live their day.

These threads come together and create a life that is created through constant movement and overlaid responsibility. The participation of digital spaces opens opportunities of autonomy, recognition and new economic opportunities but on the other hand, it increases emotional and physical burdens that women have. Their ability to meet these demands with grace that is neither romanticised nor exaggerated; it is just a part and parcel of their being. Their narratives do not describe transformation as an abrupt jump, but rather they describe a slow change of the routine life wherein power, exhaustion, arrogance, and disappointment exist. Their meditations help us to realize that digital work does not only represent a technological change but a lived experience that intertwines with the politics of family, the physical boundaries, and dreams of a better future. Their voices provide a down-to-earth and most human sense of what it involves to bargain on various types of labour in the world where the boundaries are becoming more permeable.

Patterns of somatization: the body as evidence.

Digital interaction has added new physiological requirements which increase the existing domestic and economic labour. These bodily processes provide an important account of the experience of digital literacy beyond cognition but in corporality.

Table 2. Somatization Patterns

Physical Symptom	Frequency	Interpretive Meaning
Dry eyes	11	Visual strain rooted in prolonged digital focus
Back pain	14	Accumulated pressure from physical and digital work
Insomnia	9	Emotional and cognitive overload
Arm and hand fatigue	10	Repetitive physical digital hybrid labor
Shoulder tension	8	Stress held within the upper body

The symptoms recorded in Table 2 reflect that there is no honest digital participation but on top of already present physical requirements. Most of these women start their day early and work late in the night; digital technologies prolong their labour to hours that could be dedicated to rest, creating a body tension which builds up slowly but inevitably. Their bodies have turned out to become the locations where economic desire, home allegiance, and computer use meet, and they disclose an embodied aspect of endurance, weariness, and will that transcends uneasiness.

The ambiguity of digital adoption is further seen as the difference between the advantages and the disadvantages of the digital use as characterized by the women is analyzed. Their lives flow in a back and forth motion where both excitements and fatigues are experienced and reflected in the following table.

Digital Ambivalence: Strength and Secret Liabilities

Digital literacy grants real practical benefits as well as a sense of psychological strength, but it also creates additional pressure and stresses.

Table 3. Positive and Negative Digital Impact

Positive Impact	Description	Negative Impact	Description
Autonomy	Independence in managing money and transactions	Digital overload	Work extending into late night hours
Market reach	Broader access to customers	Emotional fatigue	Stress produced by constant notifications
Flexible workspace	Ability to work from home	Household tension	Conflicts arising from online interactions
Efficiency	Faster communication with customers	Physical strain	Fatigue produced by screen exposure

Table 3 demonstrates the two-way direction of the digital involvement. On the one hand, the digital literacy streamlines the ability of the women to participate actively in local economies, which creates a sense of autonomy and boosts the spirits of confidence and dignity among the women. On one side, the same instruments are making the rhythm of everyday life faster and the boundaries are blurred that protect rest, emotional balance and family peace. The stories of the participants show that empowerment does not remove the challenge, but adds some more responsibility levels that require emotional and physical adjustment. Opportunity and strain coexist thus not contradictory, but essential to the digital participation nature in their context.

The internal family relations also complicate this situation. The digital competence has transformed the value perception, power, and contribution in the home sphere. These transitions are captured in the table below.

Gendered Shifts in Household Relations

Table 4. Gender Dynamics Before and After Digital Literacy

Aspect	Before Digital Literacy	After Digital Literacy
Decision making	Dominated by husbands	Shared and more participatory
Income contribution	Secondary	Co breadwinner
Digital autonomy	Minimal	Significant control over digital platforms
Marital tension	Low	Increased tension linked to phone usage

Table 4 also shows that digital literacy is slightly restructuring the relationship within the household. Economic contributions get symbolic meaning and improve recognition by spouses. Nevertheless, the growing tension surrounding the digital suggests that the field of technology flows through the most personal spheres of emotions and can challenge established anticipations. Therefore, the domestic realm turns out to be the place of new opportunities alongside the fragile negotiations, which emphasizes that the process of empowerment involves both growth and change.

Temporal continuity is disrupted as women get involved into digital activities. They have changing schedules as they alternate between household chores, collaborative duties, and online activities. The strategies they come up with to negotiate across this landscape are captured in the following table.

Time Fragmentation and Strategy of Adaptation

Women find themselves in the world where household chores, collaborative work, and online work are happening simultaneously.

Table 5. Time Fragmentation Strategies

Strategy	Operational Behavior	Impact
Micro tasking	Managing customers while performing domestic work	More productive use of fragmented time
Night work	Completing digital tasks after children sleep	Increased sales but reduced rest
Delegation	Receiving help from husbands	Lighter workload and improved support
Parallel processing	Managing manual and digital work simultaneously	Greater efficiency but increased strain

The approaches described in Table 5 prove that women do not surrender to online requests with a lifeless submission. Their restructuring of their time arrangements are fluid and creative to make sure that none of their responsibilities is overlooked. Micro-tasking as a situational approach is a combination of work and care, whereas night work increases productivity during the hours when rest is expected. Delegation is a slight but significant movement toward collective responsibility in the family. Parallel processing is the embodiment of physical intensity needed to maintain multitasking roles simultaneously. These modifications show how women find ingenious ways of going around the compounding time demands.

In an attempt to explain the relationships between these personal experiences and the general relational patterns, the linkage-bridging analysis provides the general picture of the interactions

between variables in the ecological context. These connections are determined in the table below.

Linkage-Bridging Analysis

The correlational analysis defines the interaction of different variables in the affects of digital results.

Table 6. Linkage Matrix

Variable A	Variable B	Empirical Evidence	Strength
Dual roles	Limited business time	Many participants experience difficulty managing time	Strong
Digital literacy	Expanded marketing reach	Most participants successfully promote online	Strong
Family support	Consistent production output	Participants with family help sustain productivity	Moderate
Digital adoption	Increased stress	Many women report insomnia or emotional strain	Strong
Peer learning	Faster adaptation	Collaborative learning accelerates digital skills	Strong

Table 6 presents a web of interrelated factors that shape the women’s digital involvement. Time limitations arising from dual responsibilities constrain productivity, yet digital literacy compensates by opening access to new markets. Family support moderates the burden of physical labor and sustains output. Stress increases as digital tasks intensify, but peer learning provides a cushion that helps women navigate technological challenges more confidently. This table demonstrates that digital empowerment is deeply relational and depends on social conditions that either support or strain the women’s efforts.

The culmination of these findings emerges in the phenomenological essence that synthesizes the core structure of the women’s lived experiences. The table below captures the components of this essence.

Phenomenological Essence

The culmination of the analysis reveals the deeper structure of experience.

Table 7. Phenomenological Essence Structure

Essence Component	Description
Fragmented temporality	Time shaped by tides, domestic care, and digital interruptions
Hybrid workspace	Home becomes both production site and digital office
Fluid identity	Women move continuously between multiple roles
Embodied endurance	The body sustains the weight of overlapping responsibilities

The essence of the experience of women is explained in Table 7. Their working days are dictated by the unpredictable beats that combine both physical and online work. Their houses are turned into multitask areas where economic and household activities are merged. They are different people when facing conflicting demands during the day. All these experiences are mediated by their bodies which are the main way to express them. This spirit manifests the richness of their robustness and the polyphrastic nature of their involvement in digital transformation.

Redesigning the Dual Burden: Digital Technology and the New Hybrid Labor Formations

The empirical findings in this research indicate that digital literacy transforms the daily lives of fisherwomen on aspects that go beyond the learning of technical expertise. In fact, rather than an inert tool, digital technology influences their daily activities as a rearranging power that restructures temporal orders, restructures domestic relationships and produces physical impressions in the corporeal space. This reading is consistent throughout the larger trends found in recent literature, especially the work that emphasizes that adoption of technology in communities which are coastal or low-income is always mediated by gendered expectations and domestic rhythms. Similar findings can be seen in research by Rahmawati and Taufiq (2021) and Pradana (2022) which point to digital integration as a process, not a transition, in which it is up to women to continually balance the potential of new opportunities and the burden of existing duties.

This negotiation can be vividly described through the lived experiences of the members of the KWN and reveals emotional swings between empowerment and exhaustion that find their reflection in the works of Mahy (2020) and Hassan and Azmi (2023), who argue that digital engagement often increases but does not reduce the invisible work of women. Such complexities are particularly noticeable when a person considers the intersection of digital literacy and the time frame of the everyday activities of women. Rather than fitting into predetermined trajectories of domestic labor, digital practices break time and create novel disruptions requiring one to switch back and forth between roles at all times.

This situation is consistent with the latest research which outlines the appearance of polytemporal labor in the microenterprises run by women, as various tasks grow simultaneously and require attending to at the same time. On the one hand, Lee and Pangestu (2021) note that women taking part in community enterprises are more and more using improvisational scheduling to fit in their growing digital loads. The Makassar female fishermen mirror this trend, as they remember the night hours on the preparation of products and the interaction with the online shoppers and recalls the mornings, when domesticity and online marketing become the same process. Similar intensification of emotional and cognitive labor has been recorded by scholars like Long (2017), Qi et al. (2019), who believe that unceasing connectivity is bound to damage separation between work and rest.

The stories of the women support this thesis and demonstrate the somatic expression of long screen time and continuous cycles of notifications through fatigue and insomnia, a trend also focused on by Zamfirova & Engelbrecht (2021) in her study of digitally enhanced embodiment.

The experiences of the body that the women have outlined in their writings also reinforce the idea that digital adoption is more of a cognitive or economic process rather than one that is inscribed into the physical register of the everyday lives. The modern studies tend to shape digital interaction as a body-stressing experience, especially when the online activity is superimposed on the physical work. Scholars like Secore Levis (2011) and Scrase (2003) stress that the compounded necessities of artisanal production, cooperative labor, and online communication with the customer are transferred to the bodies of women. The symptoms reported in this paper such as back pain, strained eye view and tiredness of arm, thus support some emerging theoretical arguments that digital transformation in marginal communities has somatic effects that should be noted as constituents of the empowerment discourse. The works by Boh et al. (2023) support this idea and frame the concept of digital adoption as a lived process where resilience and strain are always present.

These transformations overlap with just as important transformations in relations at the home. With women becoming confident enough to handle digital transactions and with increasing contributions of financial sources to the household income, there is a gradual change in power relations within the family. The awareness as identified by the participants, whereby husbands are more respectful or consults their wives on financial concerns, is indicative of a general trend found in a number of recent reports. According to the study of Javed & Mughal (2019) digital revenues tend to increase the voice of women in family decision making. But these transitions do not take place smoothly. The misunderstandings related to the common use of phones, fears of interactions online, and rivalry of the emotional availability are commonly recorded in digital gender gap literature in the region. These findings are strongly reflected in the experiences of the Makassar fisherwomen who imply that digital empowerment should be perceived as a relational and emotional bargaining and not as a simple surge in agency.

The peer learning becomes one of the most authoritative conditions that help the women adapt to the digital world. The women explain how they rely on one another to figure out the applications, uncover new interfaces and debug technical problems. This participative form of education follows the conclusions of Peterson (2014), who state that female members of a coastal cooperative tend to learn better by trial and error as a group than by being trained. Schepers et al. (2008) state that shared learning settings allow creating a feeling of emotional safety and trust in one another that would contribute to the diminishing of technological anxiety. The current research supports this thesis, indicating that the digital literacy is more significant and sustainable when it is integrated into group practices, instead of being imposed on an individual basis with individual teaching.

This dimension of relationships is supplemented by the impact of cultural values. The process of introducing siri na pacce to digital learning activities proves that the empowerment resonates better when framed by the values that are meaningful locally. The latest studies by Muñoz-Rodríguez et al. (2020) also stress the idea that cultural identity-based digital integrations are likely to result in more profound engagement and more sustainable adoption. This developing consensus is confirmed by the experiences of the KWN women, who show the ways digital participation can become interconnected with moral responsibilities, a sense of community, and the need to maintain collective dignity. This cultural anchoring reinforces the interpretative aspect of the current results and places digital literacy in the wider moral ecology of the life of the coastal communities.

When they all come together, the sense that comes out of the research is that digital literacy does not just lessen the dual burden of fisherwomen. Rather, it reconstellates that weight into some more complicated formation where opportunities and pressures are both enlarging. The more recent researchers, like Nwachukwu (2025) have cautioned that digital empowerment should be perceived as an interdependence socio-ecological process that relies on relational support, cultural resonance, and equitable labor distribution. This assertion can be effectively proved using the experiences of the women in Makassar. Their narratives depict empowerment not as linear but as a process of movement that implies negotiation, improvisation, embodied endurance, as well as cultural rooting. These stories make the study relevant to the current discussions by providing a subtle explanation to how digital transformation in coastal societies can be made sustainable through change in technology that resonates with the realities and cultural forces of the women who can support it.

Conclusion

In this research, it is found that digital literacy is a transformative power in the lives of fisherwomen, and goes beyond the aspect of equipping them with technical skills. The digital

competencies in the case of Makassar Fisherwomen's Group (KWN) can be viewed as an avenue of restructuring the relationship between the entrenched domestic commitment and economic involvement through the Home and Industrial Social Center (HISC). In the process of negotiating their two lives, digital literacy is revealed as a tool that can help the internal community resources, including siri n pacci, mutual trust, and years of domestic experience, to be combined with the external digital possibilities, like the larger market, online resources and institutional backing. It is at this delicate operation that HISC performance is boosted and it shows that empowerment would be most effective when cultural identity is co-moved, along with the technological adaptation.

However, it is also evident in the research that digitalization becomes a further layer of complexity. As the women gain confidence, economic autonomy and become more visible in the households, they are also faced with new pressures. The continuous communication, responsiveness of markets and night time digital work make working beyond their physical work, causing emotional burnout and physical exhaustion. These experiences highlight that digital tools do not ease the dual burden, instead, they transform it into a hybrid type of work where domestic and manual work meets digital work, and so on creating a continuous loop. The result is an important point that empowerment is not a gradual shift between burden and freedom but a process of negotiation full of contradictions, modifications and perseverance.

The significance of collective adaptation is more realized as the analysis progresses. The women depend on each other to learn, troubleshoot, and get emotional support, thus creating small, but powerful, nodes of solidarity, which hasten the achievement of digital competence. Such peer-learning interactions, combined with positive family relationships and values that are based on cultural aspects, form the foundation of what can be conceptualized in this study as the so-called Dual-Digital Bridge model. This model is not only a form of empowerment intervention but a lived ecosystem, which connects cultural power with the power of technology, and personal struggle with the progress of going to be together. It is this relational cloth that makes the women overcome digital difficulties in a manner that would have been significantly more cumbersome when one would do it alone.

Finally, this paper concludes that digital literacy can turn dual burdens into dual capital, but this is not an automatic and evenly spread process. It is fundamentally based on the social structures, cultural logics, emotional negotiations, and ecological rhythms that define everyday lives of fisherwomen to succeed. Digital empowerment can only be meaningful and sustainable when it is incorporated into a gendered support infrastructure that takes into account the embodied nature of the lives of women, which are marked by early mornings, disjointed time, collective work, the demands of culture, and the constant conflict between caring and productivity. Learning these dimensions, the paper confirms that the future of the digital transformation in the coastal communities should be based not merely on technology but rather on the deep knowledge of the life experiences of women and the social worlds that support them.

Recommendation The initial suggestion is to build the Srikandi Digital Squad by fostering the development of it as a learning group instead of a mini technical department. A rotating leadership approach may enable the fair sharing of the responsibility and the avoidance of dependence on a limited number of highly qualified members. Once the leadership is spread, additional women will acquire the chance to gain confidence and gradually engage in leading the digital adaptation. A mentoring strategy connected to age, i.e. by younger members accompanying older ones, can also serve as an additional facilitator in the digital learning process and strengthen support to one another among the members of the cooperative.

The second suggestion is to provide the digital literacy training that demonstrates the lived routines of the women. Their days are influenced by home care, work in production, and their interactions with customers; therefore, the training should be feasible and incorporated in discontinuity of time. The long sessions are not going to be effective because brief modules of specific tasks will be more effective than long ones e.g. working with online orders or digital payments. Digital skills are something that can be used to work less and not press more when it comes to being at work as soon as it is time to learn, as a result, this aspect of the work of a cooperative can enhance the overall performance of it.

The second valuable suggestion is to accept the emotional and physical burden that digital labor creates. A lot of the women are tired, stressed, and sometimes have tension at home that is associated with constant internet use. The cooperative can react by holding discussions on these issues and find alternative healthier methods of managing responsibilities. Emotional perception and collective approaches to strain management combined with digital empowerment would help women to continue their involvement better. The last suggestion would be to establish long-term relationships with other institutions that promote digital inclusion. Continuous training, improved connectivity, exposure to more digital practices might be offered by universities, government agencies and community organizations. Such connections are important in that they enable the cooperative to not be going it alone in its digital change but rather have a broader ecosystem of knowledge and support.

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