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Research on postpartum women's health management service design from the perspective of caring ethics

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Abstract: In order to change the current situation of discontinuous services, fragmented resources, and non-sharing of information in the postpartum market, the related maternity and health services are integrated and developed to form a diversified and integrated postpartum health management service centered on postpartum women. From the perspective of caring ethics, this paper analyzes the logical correlation between the caring practice process and the double-diamond model, innovates the double-diamond model, builds the double-diamond model-EC double-diamond model from the perspective of caring ethics, and guides the output and practice of postpartum women's health management service design strategy by insight into the four stages of caring, undertaking care, enhancing care and responding care. Notably, we incorporate biomechanical principles into this framework. By assessing postpartum women's physical conditions through biomechanical methods, such as measuring muscle strength, joint flexibility, and postural alignment, we can provide more targeted and effective recovery plans. For example, based on biomechanical data, we can design customized exercise programs for muscle rehabilitation and posture correction. Finally, under the guidance of service design thinking, with the help of "Internet +" technology integration to build postpartum health management service system. Driven by the wave of Innovation 2.0 (Internet +), we use the advantages of Internet information technology to integrate and optimize postpartum service resources, build a postpartum health management service platform, provide personalized postpartum health management solutions for postpartum women, and finally produce the "MAMALAND" app. Multiple service scenarios are connected to form a combination of online and offline services for postpartum health management services, giving postpartum women a full range of care. This paper, from the dual perspectives of caring ethics and biomechanics, explores postpartum women's health management service design and provides continuous, scientific and personalized services for postpartum women by integrating postpartum market service resources and innovating postpartum women's health management service model.

Keywords: postpartum rehabilitation; health management; ethics of care; double diamond model; service design; biomechanics

The postpartum period involves the biological and psychological-emotional transition to motherhood. However, it remains one of the most neglected stages in a woman's life [1]. Women often face challenges in postpartum physical function, mental health, and sleep, compounded by insufficient social support [2–6]. With the improvement of living standards and the enhancement of scientific health consciousness, people gradually recognize the importance and necessity of postnatal rehabilitation. Women's pregnancy and childbirth will produce hormonal changes, and organs and muscles are very easy to damage, inducing a variety of physical and mental diseases [7]. Approximately 44.5% of postpartum women suffer from pelvic floor

dysfunction [8], the incidence of diastasis recti can reach 30% to 68% within 12 months after delivery [9], and the prevalence of postpartum depression is as high as 15%–30% [10]. As expected, many women feel that their health issues are not adequately addressed postpartum [11]. Therefore, postnatal rehabilitation is crucial to women's physical and mental health [12], changing the current situation of neglect of postnatal rehabilitation, and incorporating the content of postnatal rehabilitation into maternal health management will play an important role in restoring the maternal body function and reducing the occurrence of postpartum adverse events [13]. Therefore, this paper takes caring for postpartum women as the starting point, innovates the double-diamond model from the perspective of caring ethics, constructs the service design under the perspective of caring ethics, and researches and analyses the postpartum women's health management service, proposes a continuous implementation path with multi-party participation and co-creation and multi-point integration, and constructs a set of continuous and perfect postpartum health management service for postpartum women.

1. Research background

1.1. Current situation of postpartum rehabilitation services for women

With the continuous improvement of the living level, people's consumption concept and rehabilitation awareness [14], but how to face the increasing demand of postpartum women and the demand upgrade brought by the conceptual change will become the main challenge facing the postpartum rehabilitation service market. At present, the development of postpartum rehabilitation services in China is relatively short, and the postpartum rehabilitation services market still has significant room for optimization and growth, which is mainly reflected in the following three aspects:

There is no continuous long-term post-natal service. In traditional concepts, postpartum recovery generally refers to the puerperium, a process that begins at the time of childbirth and lasts approximately six weeks. However, not all organs and systems are restored to their baseline levels during this period, and after the puerperium, women still need more time and services to recover, including the process of body This includes physical recovery, body shaping, and psychological adjustment, making postnatal rehabilitation a long recovery process. However, most of the continuous postnatal services provided by service providers in the market nowadays focus on the puerperium, that is, the services provided by monthly child care institutions for 30 to 42 days after the completion of delivery, but such service providers can only provide postnatal women with a short-term service, and are unable to provide a long period of postnatal care.

Fragmentation of postnatal rehabilitation services. The fragmentation of postpartum rehabilitation resources after puerperium, coupled with the redundant items in the postpartum rehabilitation market, the difficulty in measuring the rehabilitation effect, the cluttered information resources available online, the lack of credibility, as well as the too high cost of the pre-payment deposit stage, the user cannot predict the quality of the service afterwards [15]. The arrival of a new life also adds a lot of complicated things for women, women in the already limited energy, but still have to spend time to collect and screen information for themselves, which not

only affects the effectiveness of women's rehabilitation, but also may lead to their inability to obtain appropriate rehabilitation services.

Information on maternal rehabilitation cannot be shared continuously. At present, the independence of postnatal health service organizations creates a gap in the information on maternal rehabilitation, and therefore it is not possible to continue to share information on women's rehabilitation after childbirth. However, as women's recovery and needs vary at different stages, the lack of information sharing makes it impossible to accurately understand women's current physical conditions and needs, making it difficult to provide them with personalized and accurate services

1.2. Application of postpartum health management for women

The theory and practice of health management can be traced back to the late 1920s. It involves comprehensive screening, in-depth analysis, and scientific evaluation of individuals, and based on the analysis results, it develops personalized health plans and provides health guidance to individuals, aiming to achieve the greatest health benefits with the least investment [16]. In the field of postpartum rehabilitation, the application of health management has further brought new opportunities to the service concept, model, and industry standards for postpartum rehabilitation. Compared to traditional postpartum or puerperal care, postpartum health management not only extends significantly in terms of time, but also shows significant innovations and expansions in terms of service content and form. Peking Union Medical College Hospital, in order to allow pregnant and postpartum women to easily access high-quality service resources and multidisciplinary pregnancy health knowledge, has established a smart maternal and child health service system based on the "Internet+" model. The system relies on an internet platform to build a health profile based on individual information of pregnant and postpartum women, providing health education knowledge, health plans, and home monitoring tools that are appropriate for the pregnancy process. It offers integrated health information for healthcare professionals both within and outside the hospital. The system provides free health management services for pregnant and postpartum women and has been highly praised by both healthcare providers and patients. Within 5 months of launching, 1800 pregnant women had registered, and the number of online course learning sessions reached 11,869. This has improved the convenience for pregnant women to access high-quality medical resources, achieved a closed-loop management of maternal health information, ensured continuity of hospital medical services, and raised the level of maternal and child healthcare services. The in-depth application of health management in postpartum rehabilitation not only embodies the concept of comprehensive care throughout the entire postpartum period but also, through scientific methods and means, brings new opportunities to the postpartum rehabilitation industry.

2. Overview of relevant theories

2.1. Ethics of care

Caring ethics originated from feminist scholars' questioning of traditional moral ethics in the second half of the 19th century, and advocated a people-oriented and

emotional connection moral order with “care”, “relationship” and “sympathy” as the core. Caring ethics has a very unique perspective on the understanding and interpretation of realistic problems, and the theoretical framework and reflection model developed in it can be deeply insight and applied to many realistic challenges. Adopting caring ethics as a thinking tool to examine multiple problems in society can provide a powerful guide for our practical actions. Tronto extended care to the practical level and further proposed four stages that care should include: “Caring about”, which refers to attention to the initial care needs; “Taking caring of”, which refers to the responsibility of caring; “Caregiving”, which refers to the practical caring actions that need to be implemented; and “Care-receiving”, which refers to the response of those being cared for to the care.” [17]. At the same time, good care requires that the four stages of the caring process be combined to form a whole [18]. With the deepening of the ethical concept of “caring” in the theoretical level and its wide application in various fields, it has become a common ethical guidance across the political, economic, cultural and social fields. In short, caring ethics, as an ethic of responsibility, is applied in various fields to connect individuals in a network of relationships for the common good [19].

2.2. Double diamond model

In 2005, the British Design Council proposed a double-divergence-focusing double-diamond design model [20], whose process is mainly divided into two core parts: the first diamond is to find the right problem, and the second diamond is to find the right solution, which is divided into four steps: discovery, definition, development and delivery as **Figure 1**. Step 1 is to find problems and gain insight into existing problems and demand points by studying the current situation; Step 2 is to define the problem, focus on the key problems and determine the priority of requirements. Step 3 is to develop solutions, divergent thinking, expand creative concepts, and find solutions to problems; Step 4 For the delivery plan, the feasible plan is selected through analysis and comparison, and the feedback is repeated continuously [21].

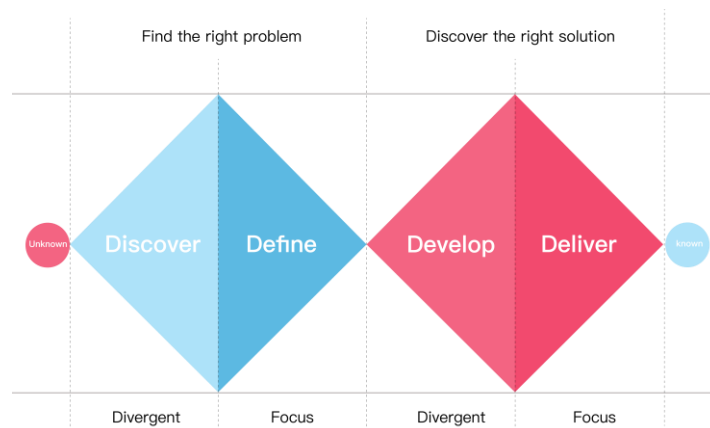


Figure 1. Double diamond model.

2.3. The relationship between the double diamond model and care practice

Based on the concepts of caring ethics and the double-diamond model, which share a common focus on user needs and emphasize contextual awareness and empathy, both frameworks have a commonality in goals and methods. Each stage has a logical correlation that echoes the other, as **Figure 2**. First, “Caring about” corresponds to the discovery phase, emphasizing attention. This requires the ability to be aware of the needs of others and to understand the specific needs and life situations of the target user group through empathy and user research. “Taking care of” corresponds to the definition phase, emphasizing responsibility. It requires the ability to clarify the responsibilities of the service design team and ensure that every team member is committed to providing professional and scientific services to users. “Caregiving” corresponds to the development phase, emphasizing capability. This requires the ability to design and develop service solutions that meet the needs of users while ensuring the scientific and feasible nature of the solutions. Finally, “Care-receiving” corresponds to the delivery phase, emphasizing response. In the process of service program implementation, continuous user feedback should be collected, and adjustments and optimizations should be made according to the feedback to ensure that the service truly meets the needs of users.

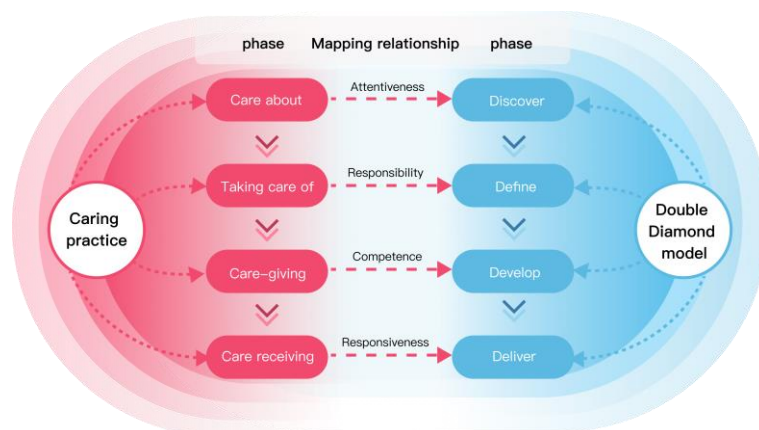


Figure 2. Logical correlation diagram of caring process and double diamond model.

3. Building a health management design model from the perspective of care ethics

Service design attaches importance to service process, integrates, plans and designs physical and non-physical elements, reasonably organizes material resources, equipment and stakeholders, and creates services that meet user needs [22]. As one of the main thinking frames of service design, the Double Diamond model has been recognized by many designers [23], and it has been improved in practice to develop more design processes suitable for service design. In the service exploration of postpartum women, in order to provide more comprehensive care, it is necessary to explore the care needs of postpartum women more carefully, refine the design process, and build a design model of women’s postpartum health management service from the perspective of caring ethics. Therefore, combined with caring ethics, the two-drill

model is increased to four-drill. It can effectively conduct behavior analysis and demand exploration of users in the service system [24], and refine the granularity of user research in the existing service design process. After childbirth, changes in the body, mind, and interpersonal relationships may put women at a higher risk of emotional fluctuations or postpartum depression, highlighting the need for psychological and emotional support [25]. The intervention of caring ethics ensures that the emotional and psychological needs of postpartum women are paid attention to in the design of health management programs from the perspective of humanistic care, so as to provide them with more comprehensive care. Finally, the two-drill model and caring practice model are combined to innovate. The construction of the double drill model from the perspective of caring ethics not only conforms to the user-centered idea of service design, but also can carry out the postpartum health management service design more comprehensively and systematically.

Based on the logical relationship between care practice and the Double Diamond model, this paper constructs the EC-Double Diamond model from the perspective of care ethics as **Figure 3**, which includes four stages: Insight Care, where user research is conducted to identify needs through interviews and empathy; Taking Care, which involves defining needs and collaborating with professionals to provide care; Enhancing Care, which focuses on innovating the health management service model, mapping the relationship between needs and behaviors, and offering comprehensive care across all stages; and Responding to Care, which includes implementing the design, evaluating feedback, and iterating the service to better meet users' needs.

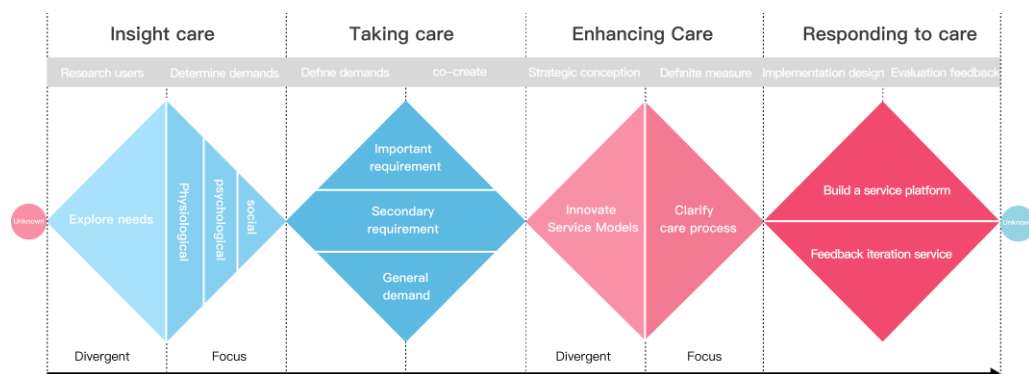


Figure 3. EC-double diamond model.

4. Health management design process based on the EC double diamond model

The design of postpartum women's health management service is based on the four links of the EC-double drill model (insight care, commitment care, promotion care, response care). The intervention of care ethics innovates the process of service design from the perspective of humanistic care, and also fits with the user-centered idea of service design. Through its multi-stage care practice, it provides an exploration framework for a more comprehensive and systematic study of postpartum health management service design.

4.1. Insight care

4.1.1. Discovering the care needs of postnatal women

Postpartum women have experienced pregnancy, and their physical and mental aspects are in a relatively fragile period, which requires the society to focus on the humanistic care for women, call for people-oriented fertility civilization, pay attention to the care needs of postpartum women, so that postpartum women can better recover themselves. First of all, we conducted user interviews with postpartum women, deeply explored the care needs of postpartum women, and established 11 cases of postpartum women. The interview mainly focused on the basic information of postpartum women, delivery methods, postpartum time, postpartum recovery needs, psychological changes, postpartum recovery plan arrangements, and family members' living conditions, among which the basic information of postpartum women interviewed as **Table 1**.

Table 1. Basic information table of postpartum women interviewed.

project	Mode of delivery	Number of deliveries	Postpartum time
Women interviewed1	normal childbirth	First-time	2 months
Women interviewed2	normal childbirth	First-time	3months
Women interviewed3	normal childbirth	First-time	6 months
Women interviewed4	normal childbirth	Second time	8 months
Women interviewed5	normal childbirth	First-time	10 Months
Women interviewed6	normal childbirth	Second time	6 months
Women interviewed7	normal childbirth	First-time	6 months
Women interviewed8	normal childbirth	First-time	4 Months
Women interviewed9	caesarean birth	First-time	12 Months
Women interviewed10	normal childbirth	First-time	1 month
Women interviewed11	normal childbirth	First-time	2 months

4.1.2. Summarizing the care needs of postnatal women

The collected interview records of 11 postpartum women were counted and analyzed, and the interview contents were coded by NVivo software, so as to dig deeply and extract the common experience, views and needs of postpartum women. Finally, the care needs of postpartum women were summarized and classified based on the interview contents. Among them, physiological, psychological and social care needs are the three first-level node needs of postpartum women, and each first-level node needs covers multiple second-level node needs. Among them, physiological care needs include functional recovery, body management and professional guidance, and psychological care needs include emotional guidance, understanding companionship, relaxation and entertainment. Social care needs include external socialization, value recognition, and identity adaptation. The coded summary of interview cases as **Table 2**.

Table 2. Interview part coding table.

project	Level 1 node	Secondary node	Mention frequency	Part of the coding content
give birth to behind woman nature	Physical care needs A ₁	Functional recovery B ₁	13	...Out of shape, I thought I can lose weight quickly, but not..... postpartum abs all the time weakness, not a big stomach..... feel the body deteriorated, may lack some professional rehabilitation knowledge...
		Lose Weight B ₂	15	
		specialized guidance B ₃	8	
	Psychological care needs A ₂	Emotional counseling B ₄	11	...All the stage of emotional breakdown, open my eyes and want to cry, too uncomfortable, I know the hormones, I can not control..... I hope my husband can accompany me, I feel like I am facing..... postpartum has been at home around the child, no time...
		Understand the company B ₅	7	
		Relax entertainment B ₆	6	
	Social care needs A ₃	External social networking B ₇	9	...Life has a new life, added a lot of things, for the pace of life..... care seems not as much as expected, as if I do this for granted..... less time to go out and chat with friends...
		Value identity B ₈	5	
		Identity adaptation B ₉	7	

4.2. Taking care

4.2.1. Determining the level of care needs of women in the postnatal period

This paper analyzes the needs of postpartum women from three aspects: physiological care, psychological care and social care, defines the level of postpartum women's care needs, and clarifies the design objectives and priorities. According to the nine-level scale table as **Table 3**, the importance degree of each level of postpartum women's demand layer and indicator layer is assigned, and the demand judgment matrix is constructed. The sum-product method is used to calculate the weight value of each index. After the weight calculation is completed, the comprehensive weight is further integrated and sorted, and the consistency index CR value is used for testing to ensure that the consistency of the matrix is verified, so as to ensure the accuracy and reliability of the evaluation results.

$$\lambda \max = \sum_{i=1}^n \frac{(AW)_i}{nWi} \quad (1)$$

$$CI = \frac{\lambda \max - n}{n - 1} \quad (2)$$

$$CR = \frac{CI}{RI} \quad (3)$$

In the formula, $\lambda \max$ is the largest feature root of the judgment matrix, Wi is eigenvectors; CI is the consistency index of the judgment matrix, n is the order of the judgment matrix. RI is the average random agreement. Calculate the groups of the available demand layer and the index layer $CR < 0.1$, That is, the consistency test is passed, and the weight of each demand index is reasonable [26]. According to the comprehensive weight values as **Table 4**, the postpartum female care needs are divided into three levels: important needs (≥ 0.12), Secondary needs (0.06~0.12) Secondary needs (≤ 0.06) Three types, The level chart of postpartum women's care needs as

Figure 4. Therefore, the important needs of postpartum women are: body management, function recovery, and emotional counseling; the secondary needs are professional guidance, understanding and companionship, and outside socialization; the general needs are: relaxation and entertainment, identity adaptation, and value recognition.

Table 3. A nine-level scale table.

Importance scale	Scale value Note (importance of index A)
1	equally important
3	a little important
7	very important
9	Absolutely important
2, 4, 6, 8	The median value of the adjacent scale
count backwards	The importance of index a than index b is more important than index a

Table 4. Postpartum female demand index weight and ranking table.

Demand layer	weight	Index layer	weight	Comprehensive weight	sort
Physical care needs A ₁	0.54	Functional recovery B ₁	0.34	0.18	2
		Lose Weight B ₂	0.52	0.28	1
		specialized guidance B ₃	0.14	0.08	4
Psychological care Requirement A ₂	0.30	Emotional counseling B ₄	0.55	0.16	3
		Understand the company B ₅	0.24	0.07	5
		Relax entertainment B ₆	0.21	0.06	6
social care Requirement A ₃	0.16	Relax entertainment B ₇	0.45	0.07	5
		Value identity B ₈	0.17	0.03	7
		Identity adaptation B ₉	0.38	0.06	6

give birth to behind woman nature

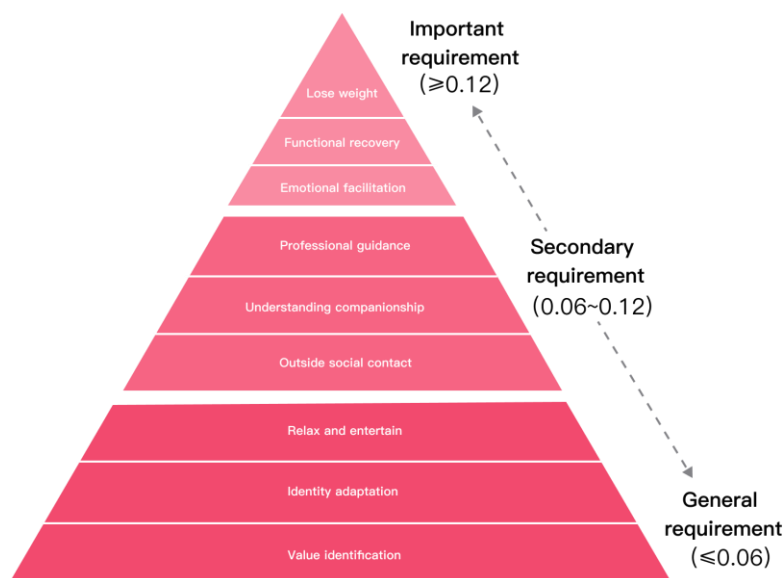


Figure 4. Postpartum women care demand level map.

4.2.2. Coordination of care for women in the post-natal period

After obtaining the level of care needs of postpartum women, through the integration of the organizational management system and stakeholders [27], the personnel capable of providing care are established into an interdisciplinary design cooperation team to provide comprehensive and whole-process care as **Figure 5**. Team members include postpartum women and stakeholders, such as family members, doctors, nurses, community workers, nutritionists, professional fitness coaches, psychologists, etc. Doctors assess postpartum women's health status and specific needs; Multidisciplinary members share assessment results, collaborate to develop personalized care programs, continuously monitor postpartum women's physical and psychological changes, and adjust services in a timely manner based on user feedback.

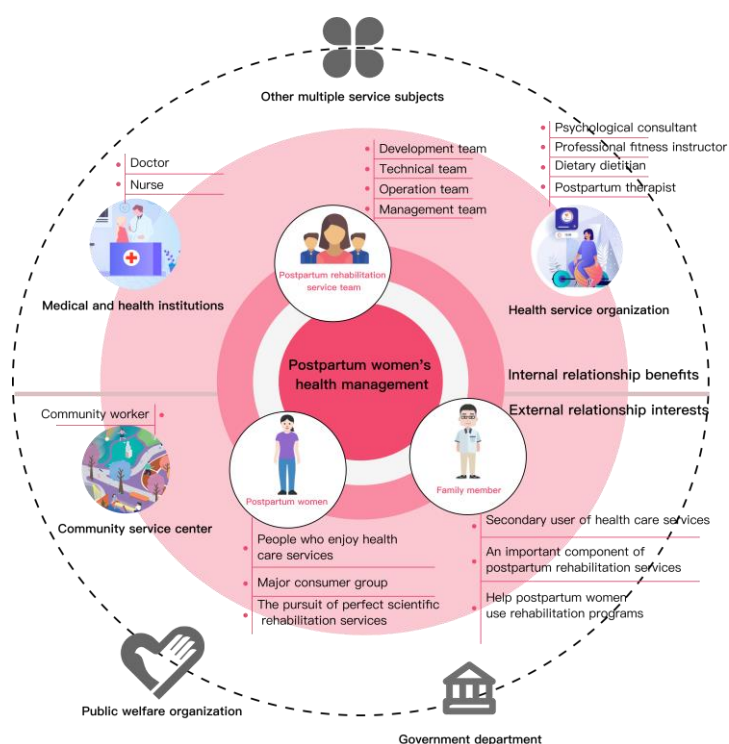


Figure 5. Postnatal health management service stakeholder map.

4.3. Enhancing care

4.3.1. Innovative model of women's postnatal health management

In order to meet the increasing demand of postpartum women and the upgrading of demand brought by the change of concept, and improve the care for postpartum women, it is necessary to innovate the postpartum health management service model, build the linkage of postpartum women's health management service, and form a comprehensive care for postpartum women as **Figure 6**. First of all, the government issues policy guidance, is responsible for departmental coordination, audits the qualifications of service providers, and carries out macro-control of service operation through funding, supervision and regulation. Each health service agency breaks the barriers between different departments to provide the operation and management of the community postpartum health management service platform; Responsible for the provision of health management personnel, equipment and technology, linking

professional rehabilitation resources to a closed home environment, so that postpartum women can get professional and continuous postpartum health management services. The development of mobile Internet and the application of big data make it more convenient for mobile terminal applications to collect user information [28]. The hospital conducts examination and evaluation of the pregnant women and uploads the examination information to the service platform. The community undertakes rehabilitation management for the pregnant women and provides space and place for offline activities to assist and complete the health management plan. Through the platform, pregnant women can receive services provided by all parties for rehabilitation, exercise courses training, and offline examination and rehabilitation programs. This paper builds an offline community postpartum health management service platform on the basis of the online postpartum health management service system, guarantees the effective docking between stakeholders and postpartum women groups, truly forms an integration model of online and offline coordinated development of postpartum health services, and achieves whole-person, whole-process and all-round care.

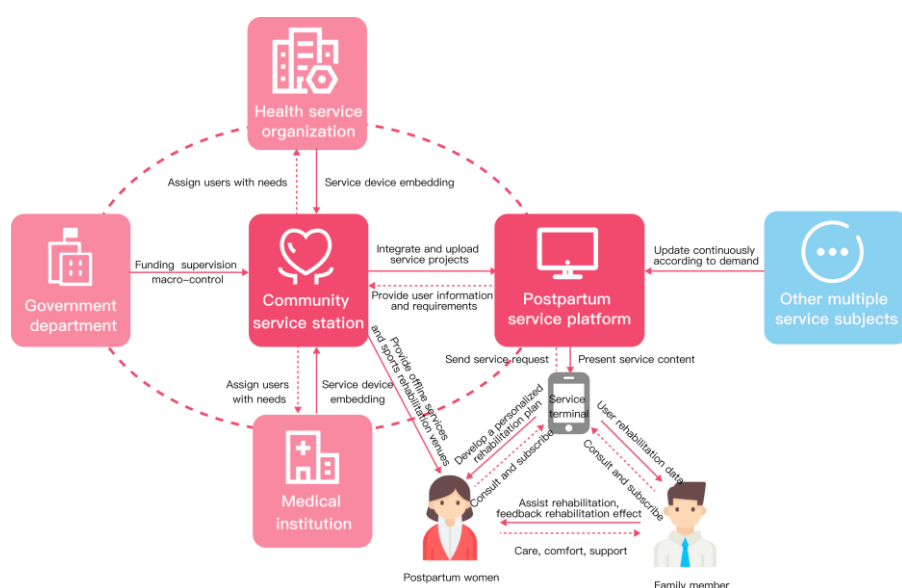


Figure 6. Postpartum health management service model.

4.3.2. Clarify the continuous care process of health management services

According to the level of care needs of postpartum women, the needs and behaviors of postpartum women are mapped and connected. The service focuses on the behavior of postpartum women in four stages, and provides basic protection for postpartum women's behavior through community basic service facilities and postpartum health management teams. Build a whole-life continuous care service process centered on postpartum women, so that postpartum women can experience complete and continuous health management services in the transfer process of various health service places and institutions, provide high-quality scientific services to women to the greatest extent, and build a blueprint for postpartum women's health management services as **Figure 7**.

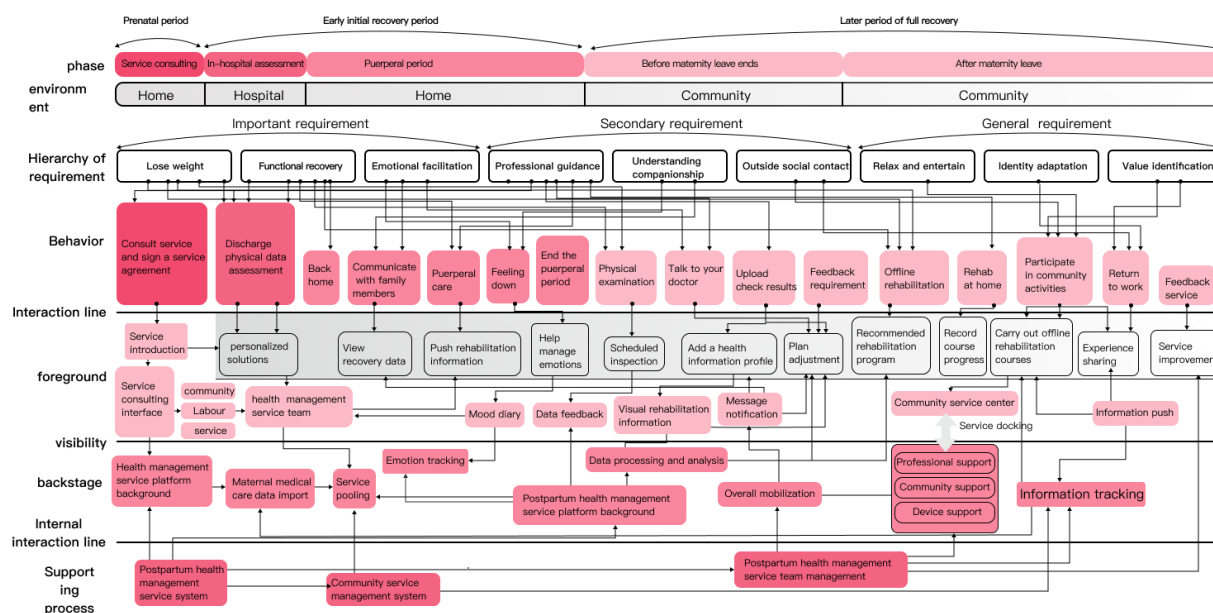


Figure 7. Postpartum women’s health management service blueprint.

The health management of postpartum women can be divided into three stages: the prepartum stage, early recovery stage, and late full recovery stage. The prepartum stage refers to the period before childbirth, during which the main task is to understand and consult postpartum health management services and decide whether to participate in the services. The focus of this stage is to help the mother plan her postpartum recovery plan through scientific guidance. The early recovery stage is divided into two periods: the in-hospital evaluation period and the early home recovery period. The in-hospital evaluation period is the time spent in the hospital after childbirth, during which the mother’s physical condition is observed and assessed, and a personalized health management plan is developed, including breastfeeding guidance, wound care, and nutritional advice. The early home recovery period refers to the 6 to 8 weeks postpartum, during which the mother focuses on initial physical recovery at home, including breastfeeding support, early diagnosis and treatment of symptoms such as genital or sexual pain and urinary/faecal incontinence, pelvic floor rehabilitation, and sexual health guidance, including intimate hygiene [29,30]. The late full recovery stage begins with the end of maternity leave and can be divided into two periods: before and after the end of maternity leave. Before the end of maternity leave refers to the period before 6 months postpartum. The goal of this stage is to achieve comprehensive physiological and psychological recovery and prepare for returning to work, while helping the mother adapt to the psychological challenges associated with role transition. After the end of maternity leave refers to the period from 6 to 12 months postpartum, during which the woman needs to balance family, career, and personal health, adjusting her state through scientific health management and achieving coordination of multiple roles. This staged division can better address the specific needs of mothers at different times, providing more targeted health management services to help them complete postpartum recovery and role transition smoothly.

Postpartum female behavior in postpartum health management. During the prenatal period, the mother and her family jointly determine their wishes, go to the

nearby community service center for consultation, sign the postpartum health management service agreement, and the postpartum health management service is formally involved in the life of the mother until the mother gradually returns to the prenatal state. Postpartum women cooperate with the hospital for physical examination and evaluation, and work with the postpartum health management team to develop a preliminary postpartum health management plan. When women return home, they start early home recovery in accordance with the postpartum health management program, learn puerperal nursing knowledge and parenting skills through the postpartum health management platform, and make an appointment for on-site rehabilitation services to promote physical recovery, and communicate with their families to complete the postpartum health management program. Finally, after the end of the puerperal period, the mother went to the hospital for a comprehensive assessment and review, and gave feedback on her needs. The postpartum health management team adjusted the plan according to the inspection results and demand feedback, and then the mother started a full recovery according to the adjusted plan, conducted online rehabilitation training and offline service projects through the postpartum health management platform, and gradually returned to work. Return to the prenatal state.

Establish a postpartum women's health management service system based on the community management system. After the community receives the medical information of postpartum women and transfers it into the postpartum health management service system, the background will provide personalized health management programs, service coordination, and back-end management and service team management of the postpartum health management service platform for postpartum women. As the basis of the service system, the community connects with service providers to provide services for postpartum women. Postpartum women's health management service team provides professional personnel and equipment support for the community, and at the same time, continuous service tracking of postpartum women through community management to help women better recover. When the evaluation results show that postpartum women have returned to a normal state of life, it indicates that postpartum health management services have formed a complete closed loop, and it also means that the full range of care and support for postpartum women has been successfully achieved.

4.4. Responding to care

4.4.1. Building a platform for postnatal women's health management services

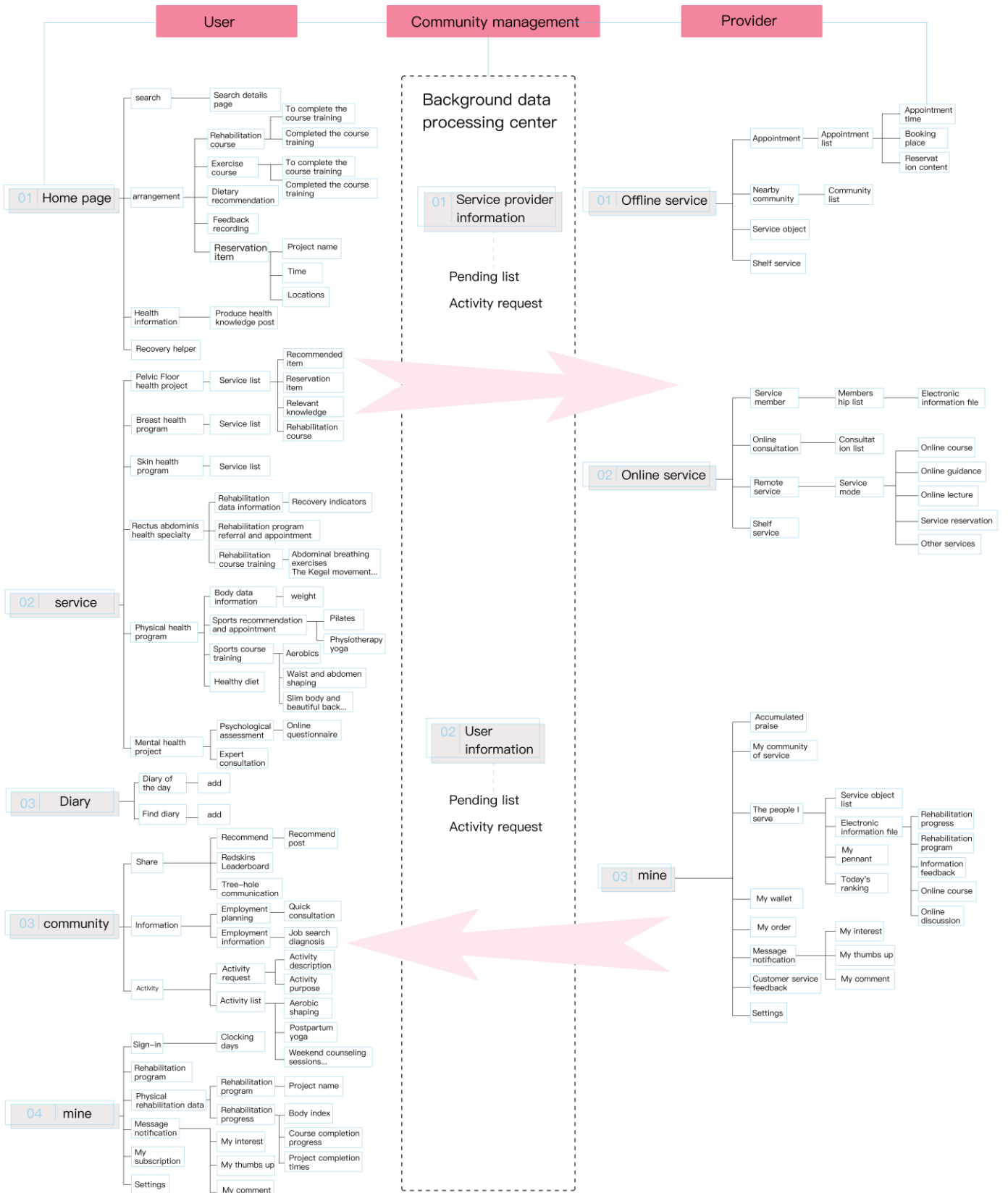


Figure 8. "MAMALAND" app information architecture.

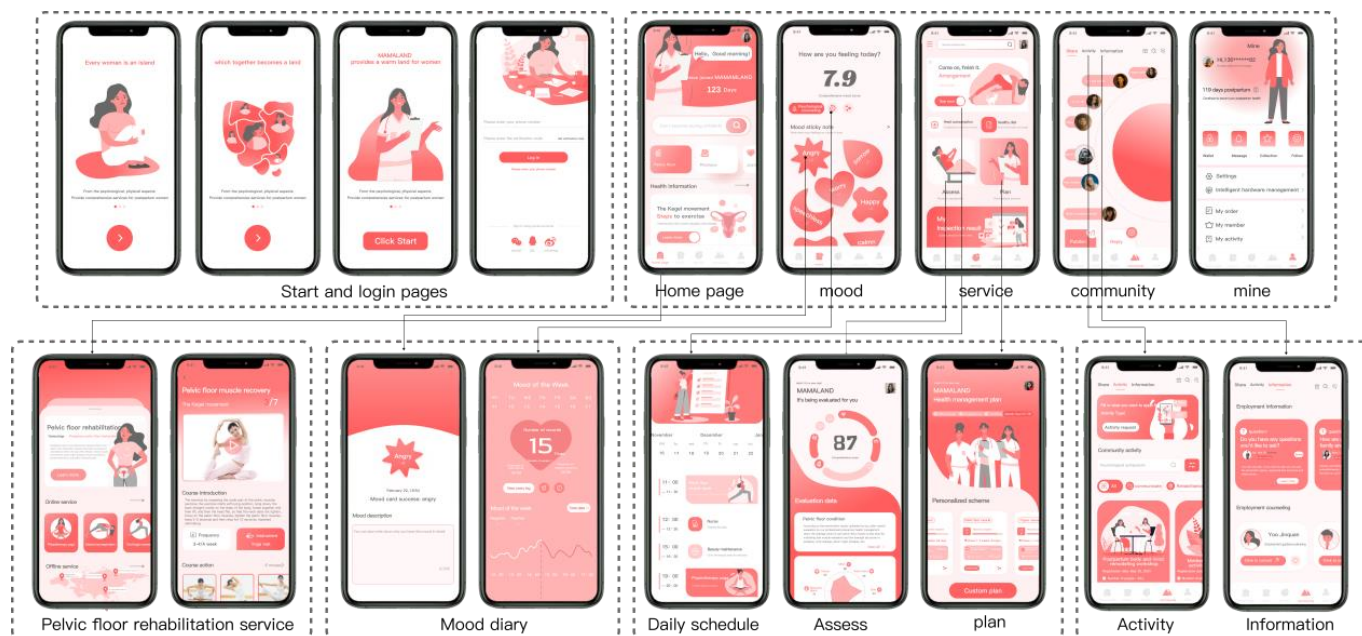


Figure 9. Part of the user interface of “MAMALAND” APP.

Under the guidance of the wave of Innovation 2.0 (Internet +), the postpartum health management service resources are integrated and deeply optimized by using the advantages of Internet information technology to ensure the effective use and efficient allocation of resources, and to build a postpartum health management service platform. “MAMALAND” app, as an important part of postpartum women’s health management service, is an application software built on the mobile platform, its architecture covers three parts: the client side for service users, the supply side for service providers, and the community management side responsible for managing the entire community. The function module of the service platform as **Figure 8**. Considering that “MAMALAND” app accurately locates postpartum women as its core user group, a large number of pink colors are used as the tone in visual design. This color choice not only implies warmth and beauty, but also conveys meticulous care and care for postpartum women. At the same time, the application interface integrates a flat illustration style, giving the interface a fresh, lovely and energetic atmosphere, making the use process more pleasant and relaxed as **Figure 9**.

1) Service User

The core content of the client service platform covers online postpartum health management services, child-rearing knowledge push, maternal health information archives, post-discharge rehabilitation training guidance and tutorials, visual data feedback in the rehabilitation process, community health dynamic sharing, and rehabilitation project selection and appointment and other related information

2) Service Provider

The core content of the service supply side covers offline service project appointment, online question-and-answer, maternal health information data processing and feedback, personalized rehabilitation plan formulation, postpartum rehabilitation medical and health, service recommendation and other information.

3) Community Management Terminal

The core content of the community management side covers the information of community mothers and nearby health resources, manages and tracks the information of community mothers, organizes and publishes offline course activities in the community, and provides space and places for offline course activities to assist in the completion of rehabilitation programs, such as offline rehabilitation training guidance, reduction and reshaping courses, psychological counseling and other activities.

4.4.2. Feedback on postpartum women's health management services

By inviting 11 postpartum women to conduct usability testing, the study aimed to assess user satisfaction with the interactive experience of the postpartum health management service system design and identify any design issues. The testing involved postpartum women making appointments for offline postpartum rehabilitation services, recording their moods online, participating in online postpartum rehabilitation training courses, and browsing information. A satisfaction questionnaire scale was developed based on 12 evaluation criteria, including feasibility, reliability, recognizability, ease of use, real-time performance, interactivity, flexibility, convenience, scalability, openness, functionality completeness, and alignment with needs. Expert interviews and questionnaire surveys were conducted to complete the evaluation and scoring, followed by data analysis as **Figure 10**. The results showed that the mean scores of the postpartum women's health management service system exceeded 80% of the sample values for most indicators, indicating that the system effectively enhances user satisfaction. However, user feedback highlighted that the system and application scored lower on interface recognizability and functionality completeness, while receiving higher ratings for alignment with needs and scalability. Therefore, future designs should focus on leveraging the system's strong scalability to enrich and improve the layout of functions [31], while also placing emphasis on optimizing the user interface to enhance recognizability and intuitiveness. This would better serve the diverse user group of postpartum women. Additionally, it is essential to continue collecting and analyzing potential issues during the application's use, optimizing and adjusting the application prototype to ensure the design better aligns with and meets the actual needs and preferences of postpartum women.

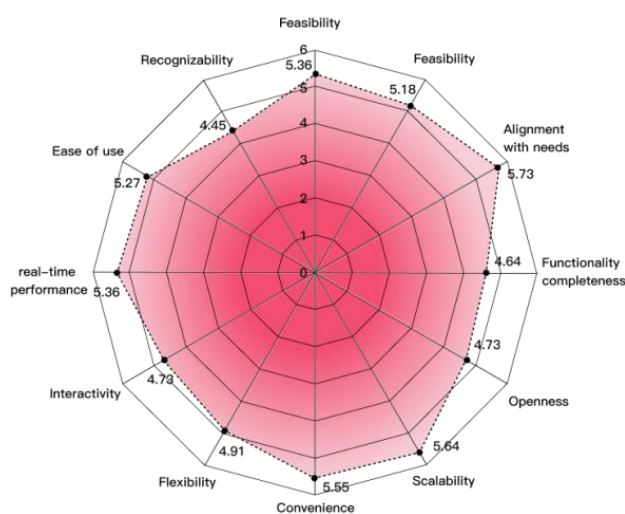


Figure 10. Service system design application evaluation.

5. Conclusion

In the context of the continuous growth of demand for maternity and health care in recent years, this paper conducts an in-depth exploration of the current status of women's postpartum rehabilitation services, and introduces service design thinking to guide the output and practice of postpartum women's health management service design strategies. This paper innovates the double drill model from the perspective of caring ethics, constructs the double drill model-EC double drill model from the perspective of caring ethics, and builds a female postpartum health management service system with the help of "Internet +" technology integration under the guidance of service design thinking. This system aims to break the incoherence of traditional resource distribution, promote the deep integration and collaborative development of various related maternity and health services, and ultimately form a continuous, diversified and inclusive postpartum health management service chain, providing one-stop and all-round rehabilitation support for postpartum women. It is of great significance to optimize service process, achieve better rehabilitation effect and meet people's health needs.

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